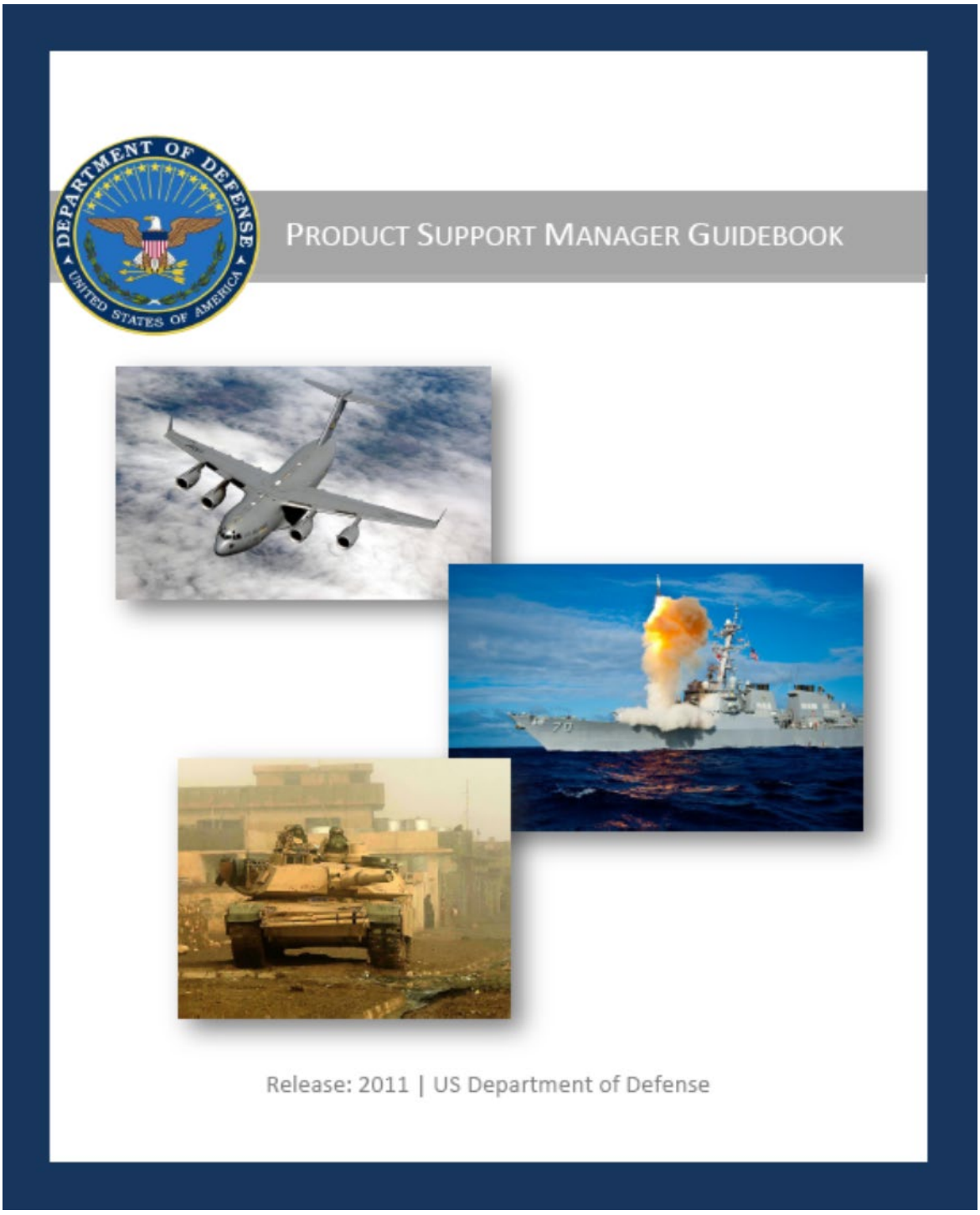

Update: December 2019 | U.S. Department of Defense

Foreword

In an environment of increasingly constrained budgets and a growing proliferation of threats around the globe, the need for world-class product support has never been more urgent. Success in this environment depends on innovative leaders in acquisition programs who can balance the competing

priorities of capability, flexibility, and affordability. Nowhere are these competing priorities felt more strongly than in sustainment. The Product Support Manager (PSM) is the key leader in whom the Department has entrusted the task of managing these competing priorities and delivering U.S. warfighting readiness.

There have been a number of important changes impacting product support since the 2011 release of the *PSM Guidebook*. Congress has increased the number and scope of PSM responsibilities. Updates to the Better Buying Power initiatives have emphasized critical thinking in the Department's methods for developing, producing, and supporting weapon systems. Affordability, cost consciousness, and innovation permeate all areas of acquisition and sustainment. Heightened emphasis on the effective use of performance-based logistics arrangements promises to improve sustainment performance and cost control. Revisions to procedures governing the Defense Acquisition System emphasize the criticality of life-cycle management and formalize the purpose of the life-cycle sustainment plan as a key program management and decision support tool.

This new update to the *PSM Guidebook* reflects these policy changes and the increased emphasis on support and controlling life-cycle cost. Additionally, this version includes an appendix on the PSM career path to lay the foundation for a more effective and professional life-cycle logistics workforce. Finally, this version continues to provide Program Managers and PSMs an easy reference for managing product support across the entire life-cycle of the weapon system.

David J. Berteau
Assistant Secretary of Defense for Logistics and Materiel Readiness
April 2016

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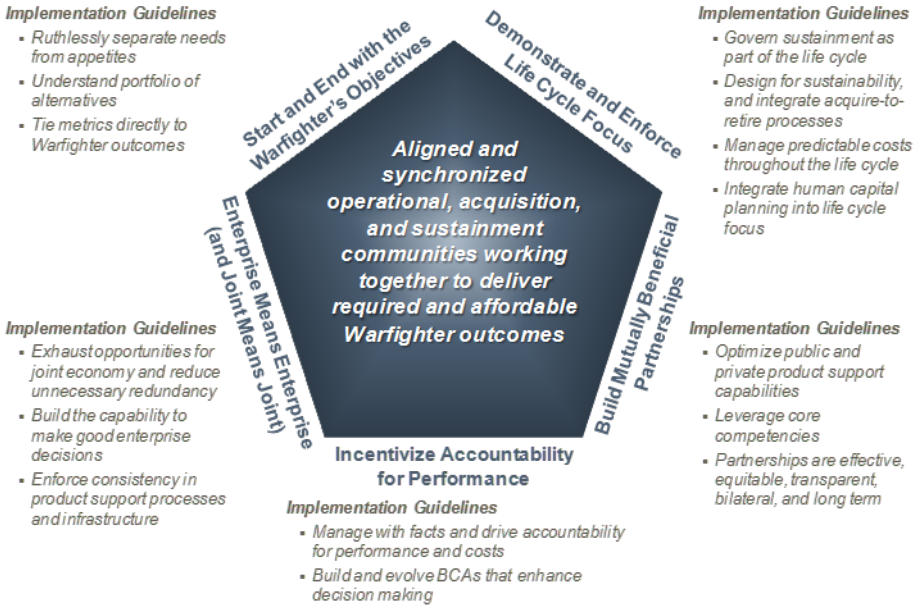
Supersession Instructions

This document replaces *Performance-Based Logistics (PBL): A Program Manager's Product Support Guide*, published in March 2005, which has been commonly referred to as "the PBL Guide," and updates the *PSM Guidebook*, released in March 2011.

1.0 Introduction, Background, Purpose, Major Tasks of the PSM; Relationship to Policy & Other Guidance

Figure 1. Product Support Guiding Principles.


Implementation Guidelines
Ruthlessly separate needs from appetites
Understand portfolio of alternatives
Tie metrics directly to Warfighter outcomes
Start and End with the Warfighter's Objectives
Demonstrate and Enforce Life Cycle Focus
Implementation Guidelines
Govern sustainment as part of the life cycle
Design for sustainability, and integrate acquire-to-retire processes
Manage predictable costs throughout the life cycle
Integrate human capital planning into life cycle focus
Aligned and synchronized operational, acquisition, and sustainment communities working together to deliver required and affordable Warfighter outcomes
Enterprise Means Enterprise (and Joint Means Joint)
Build Mutually Beneficial Partnerships
Implementation Guidelines
Exhaust opportunities for joint economy and reduce unnecessary redundancy
Build the capability to make good enterprise decisions
Enforce consistency in product support processes and infrastructure
Implementation Guidelines
Optimize public and private product support capabilities
Leverage core competencies
Partnerships are effective, equitable, transparent, bilateral, and long term
Incentivize Accountability for Performance
Implementation Guidelines
Manage with facts and drive accountability for performance and costs
Build and evolve BCAs that enhance decision making

The product support guiding principles enable a sustainment vision that aligns operational, acquisition, and sustainment communities to deliver required and affordable Warfighter product support outcomes.

1.1 Introduction

This guide is a tool for Program Managers (PMs), Product Support Managers (PSMs), their support staffs, and others in acquisition and sustainment organizations as they develop and implement product support strategies for new programs, major modifications to legacy programs, or as they re-validate and re-engineer product support strategies for existing fielded systems. This guide is focused on identifying, developing, implementing, incentivizing, and measuring quantifiable best value[1] outcome-based product support solutions that optimize Life-Cycle Cost (LCC) and readiness. It delineates processes for outcome goals of systems, ensures that responsibilities are assigned, provides incentives for attaining these goals, and facilitates the overall life-cycle management of system reliability, availability, supportability, and LCC. It seeks to provide an integrated acquisition and sustainment framework for achieving Warfighter performance requirements throughout a program life-cycle. This guidebook advocates the product support guiding principles, shown in **1.2** , and comprises the efforts and expertise of

[1] Best value is defined as the tradeoff between cost and performance that provides the greatest overall benefit to the warfighter and the taxpayer.

representatives from the Department of Defense (DoD), Components, Services, Agencies, the Joint Staff, the Office of the Secretary of Defense (OSD), industry, and academia.

1.2 Background

"The PM shall be the single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment. … PMs shall consider supportability, LCC, performance, and schedule comparable in making program decisions. Planning for Operation and Support [O&S] and the estimation of Total Ownership Cost [TOC] shall begin as early as possible. Supportability, a key component of performance, shall be considered throughout the system life-cycle."[2]

"The tenets of Life-Cycle Management [LCM] emphasize an early focus on sustainment within the system life-cycle. [LCM] is the implementation, management, and oversight, by the designated PM, of all activities associated with the acquisition, development, production, fielding, sustainment, and disposal of a DoD system across its life-cycle. This guide emphasizes those sustainment analyses, activities, and documents within these phases necessary to ensure the design, development, testing, production, and fielding of reliable, affordable, and maintainable systems." [3]

In LCM, the PM, with responsibility delegated to the PSM for product support activities, is responsible for the development and documentation of an Acquisition Strategy to guide program execution from program initiation through re-procurement of systems, subsystems, components, spares, and services beyond the initial production contract award, post-production support, and through retirement or disposal.

PMs pursue two primary support objectives. First, the weapon system must be designed to deliver the required warfighting capability and be affordable. Second, the product support solution must be efficient and effective, and it must reduce the demand for product support while meeting Warfighter requirements. When developing and implementing a product support strategy, the goal is to balance and integrate the support activities necessary to meet these two objectives. LCM is therefore the implementation, management, and oversight, by the designated PM, of all activities associated with the acquisition (such as development, production, fielding, sustainment, and disposal) of a DoD weapon system across its life-cycle. LCM bases major system development decisions on their effects on life-cycle operational effectiveness and affordability. LCM therefore encompasses, but is not limited to, the following:

- Single point accountability (the PM, with direct support from the PSM) for developing and delivering program product support objectives including sustainment
- Development and implementation of product support strategies and arrangements
- Documentation of product support strategies in the Life-Cycle Sustainment Plan (LCSP) that tie together requirements and affordability
- Continuing and regular reviews, revalidation, and update of product support and sustainment strategies, including the LCSP and the Business Case Analysis (BCA). Implementation of the LCM approach requires that all major materiel considerations and functional decisions consider their impacts on sustainment effectiveness and affordability. In addition, LCM assigns the PM responsibility for effective and timely acquisition and product support of a weapon system throughout its life-cycle

Product support, a key life-cycle management enabler, is the package of support functions required to deploy and maintain the readiness and operational capability of major weapon systems, subsystems, and components, including all functions related to weapon systems readiness. The package of product support functions related to weapon system readiness (and which can be performed by both public and private entities) includes the tasks that are associated

[2] *DoDD 5000.01 The Defense Acquisition System*

[3] *CJCSM 3170 Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS)*

with the Integrated Product Support (IPS) Elements.[4] These elements are an expansion of the Integrated Logistics Support (ILS) elements and should be considered during the development, implementation, and subsequent revalidation of the product support strategy. Product support and SE activities must be integrated to deliver an effective and affordable product support package.[5] As with effective Systems Engineering (SE), PSM involvement early in design is a critical part of ensuring a supportable and affordable system.

Product support is scoped by the IPS Elements, which provide a structured and integrated framework for managing product support. The IPS Elements are: Product Support Management, Design Interface, Sustaining Engineering, Supply Support, Maintenance Planning and Management, Packaging, Handling, Storage, and Transportation (PHST), Technical Data, Support Equipment, Training and Training Support, Manpower/Personnel, Facilities and Infrastructure, and Information Technology (IT) Systems Continuous Support. Further discussion on the IPS Elements is contained in **Section 0** and **Appendix A – IPS Elements**.

Product support considerations begin prior to Milestone A with early requirements determination, and continue through system design, development, operational use, retirement, and disposal. Recognizing that 60–70 percent of system LCC frequently is in O&S, efforts to improve product support management have been an ongoing point of emphasis for DoD in order to address the following recurring deficiencies:

- Sub-optimization of the overall IPS strategy, despite optimization of discrete IPS Elements, because product support decisions are often accomplished within IPS Element stovepipes
- Inconsistent meeting of Product Support Business Model (PSBM) requirements (such as enterprise objectives, funding stability, supply chain operational strategy, and cost and performance measurement and incentives)

Product support BCAs that are used to support product support decisions often have missing or incomplete data, were not completed or fully documented, did not demonstrate a full understanding of the program cost drivers or interdependencies, or were not as comprehensive as required. While in the past product support efforts have demonstrated clear successes, there is a need for a more uniform and rigorous application of product support governance and best practices.

This guidebook provides the PSM with the tools[6] and a PSBM framework needed to develop and implement a comprehensive product support strategy.

1.3 Purpose

The PM is charged with delivering Warfighter-required capabilities while the PSM, working for the PM, is responsible for developing and implementing a comprehensive product support strategy early in the acquisition cycle, and during and after fielding, adjusting performance requirements and resource allocations across Product Support Integrators (PSIs) and Product Support Providers (PSPs). Furthermore, the PSM's responsibility carries across the life-cycle of the weapon system, requiring the revalidation of the business case prior to any change in the support

[4] See **Appendix A – IPS Elements**.

[5] A Product Support Package is comprised of the logistics elements and any sustainment process contracts or agreements used to attain and sustain the maintenance and support concepts needed for materiel readiness.

[6] See the DAU Product Support Analytical Tools Database website for a list of available tools (https://www.dau.edu/tools/t/Product-Support-Analytical-Tools-Database). –.

strategy or every five years, whichever occurs first. The PSM must be a properly qualified member of the Armed Forces or a full-time employee of the DoD.[7]

This guidebook expands the set of solutions the PSM can use in fulfilling Warfighter requirements. It expands the range of product support strategies from the binary labels of "PBL" or "traditional transactional" to a more accurate description of the range of alternatives via the PSBM explained later in this guide, which recognizes two fundamental axioms of product support.

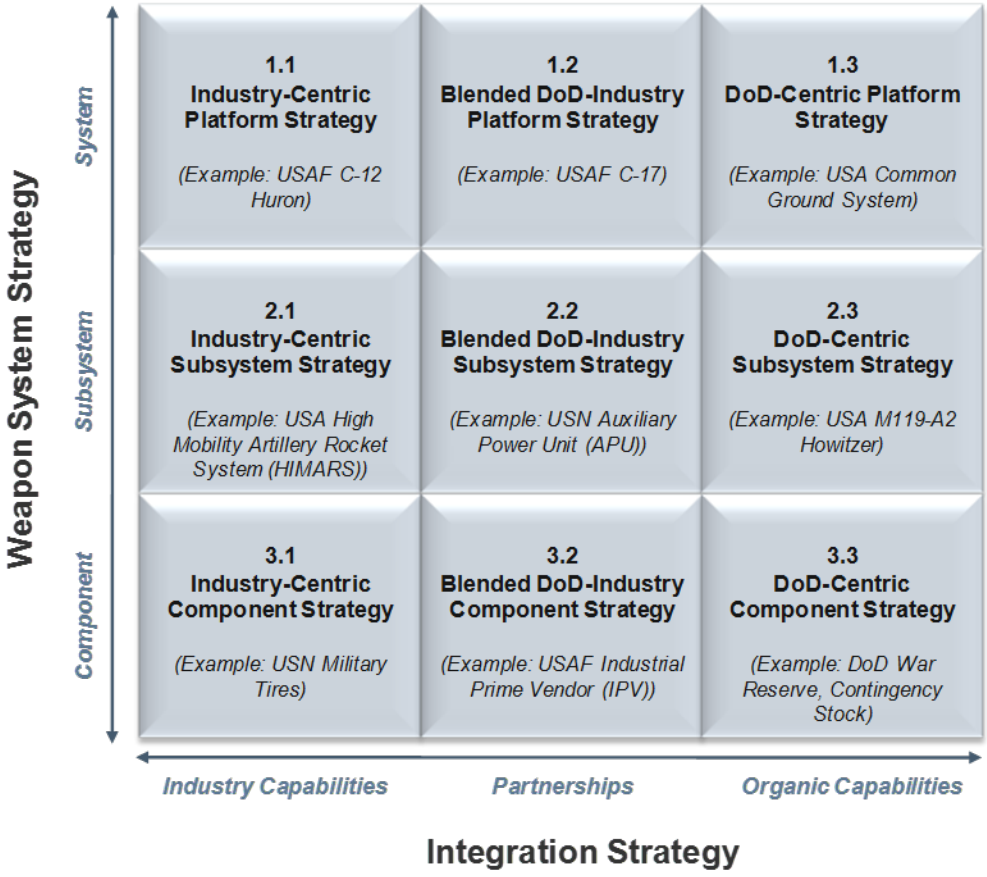
1) With few exceptions, every product support strategy depends on both organic and commercial industry support. The intent of the PSM is to determine the appropriate type and level of analysis for the best blend of public and private resources, and the partnering relationship between those entities, to achieve an effective product support strategy that delivers Warfighter operational readiness.
2) The objective of the product support strategy is to achieve cost-effective Warfighter operational readiness outcomes. Achieving these outcomes depends upon optimizing the IPS Elements that comprise the support strategy. The PSM should determine the appropriate performance metrics for the IPS Elements that in aggregate achieve the top-level Warfighter operational outcomes and reduce O&S cost. These performance metrics ensure achievement of the outcomes required for the objective weapon system, subsystem, and components.

Finally, this guidebook helps PSMs objectively decide on the appropriate blend of public and private resources[8] in the support strategy based on the available data, consideration of total costs, identification of implementation metrics and incentives, and achievement of measurable outcomes consistent with statute, policy, and Warfighter requirements. The ultimate strategy strikes the proper balance between operational suitability and affordability. The result of the PSM's efforts will be a support solution that resides within the product support framework shown in **Figure 2**.

Figure 2. Product Support Decision Matrix (PSDM).

[7] Public Law (PL) 111-84 *The National Defense Authorization Act for Fiscal Year 2010*, Section 805, and *The John Warner NDAA of 2007*, Section 820a

[8] See the *DoD Public-Private Partnering (PPP) for Product Support Guidebook* (https://www.dau.edu/tools/t/DoD-Public-Private-Partnering-(PPP)-for-Product-Support-Guidebook).



The matrix shows the continuum between component- and system-centric strategies, and partnerships using predominately commercial or industry capabilities to Government or organic capabilities.

Product support strategies can take many forms at many levels, leveraging the capabilities of a variety of PSPs. They can be established and implemented at the system, subsystem, or component levels; they can more heavily leverage the industry capabilities of the commercial sector, organic Government capabilities, or an integrated best-value mix of commercial and organic sector competencies, capabilities, and expertise. There are a variety of options represented on the matrix shown in Figure 2. Each of the nine blocks could be resolved into further distinctions for specific product support strategy solutions. The optimum support strategy will be identified along a continuum of support alternatives between commercial and organic, and system to component. Often, it will leverage the capabilities of both sectors through the use of Public-Private Partnerships (PPP).[9] Ultimately, the product support strategy will depend on the unique requirements, constraints, and boundary conditions associated with a specific program. These constraints include statutes (e.g., Core, 50/50), policy (e.g., *Contractors Accompanying the Force*), Service policy and preferences (e.g., *Organic Operation of Forward Theater Functions*), funding, and the organizations where core competencies reside.

The product support strategy requires flexibility to adjust to changing requirements and constraints throughout the program's life. Decisions made early in the program's life can affect the ability to evolve the support strategy later in the life of the program. The PM, along with the PSM, may delegate levels of responsibility for system support implementation and oversight to

[9]Title 10 U.S.C. § 2474, 2770, 2563, 2208j, and 2667

PSIs at the system, subsystem, or component level, in order to manage public and private sources of support in meeting agreed-to performance outcomes. Source of support decisions should not favor either organic (Government) or commercial providers, unless mandated by statute. The decision should be based upon a best-value determination, as evidenced through the analytical process, that assesses the best mix of public and private capabilities, infrastructure, skills base, past performance, and proven capabilities to meet set performance objectives. Although this can include transaction-based purchases of specified levels of spares, repairs, tools, and data, the more effective approach is to obtain specified levels of performance of system availability and reliability within LCC constraints. Thus, implementation responsibility and corresponding level of risk for making support decisions are delegated to the PSI by identifying desired outcomes, without specifying how to do it.

It is important to note that the product support strategy for any specific program or component must be tailored to the operational and support requirements of the end item, and in some cases to the Service- or DoD-level goals and objectives. However, readiness and availability must be balanced with affordability, taking budget realities into account. There is no "one size fits all" approach to product support strategy development and implementation. Similarly, there is no single agreed-to template regarding sources of support when implementing these strategies.

1.4 Major Tasks of the PSM

The PSM for a major weapon system must provide the best possible product support outcomes and maximize competition while making use of public and private resources at the system, subsystem, and component levels, at the lowest O&S cost. The PSMs have 11 major tasks:[10]

1. Develop and implement a comprehensive product support strategy for the weapon system.
2. Use appropriate predictive analysis and modeling tools that can improve material availability and reliability, increase operational availability, and reduce O&S cost.
3. Conduct appropriate cost analyses to validate the product support strategy, including cost-benefit analyses, as outlined in OMB Circular A-94.
4. Ensure achievement of desired product support outcomes through development and implementation of appropriate Product Support Arrangements (PSAs).
5. Adjust performance requirements and resource allocations across PSI and PSPs as necessary to optimize implementation of the product support strategy.
6. Periodically review PSAs between the PSIs and PSPs to ensure the arrangements are consistent with the overall product support strategy.
7. Prior to each change in the product support strategy, or every five years, whichever occurs first, revalidate any business-case analysis performed for the strategy.
8. Ensure that the product support strategy maximizes small business participation at the appropriate tiers.
9. Ensure that PSAs for the weapon system describe how such arrangements will ensure efficient procurement, management, and allocation of Government-owned parts inventories in order to prevent unnecessary procurements of such parts.
10. Make a determination regarding the applicability of preservation and storage of unique tooling associated with the production of program specific components; if relevant, include a plan for the preservations, storage, or disposal of all production tooling.[11]
11. Work to identify obsolete electronic parts that are included in the specifications for an acquisition program of the DoD and approve suitable replacements for electronic parts.[12]

These tasks are systematically addressed throughout this guidebook.

[10] Title 10 U.S.C. § 2337 – Life-Cycle Management and Product Support

[11] PL 110-417 *The National Defense Authorization Act for Fiscal Year 2009,* Section 815

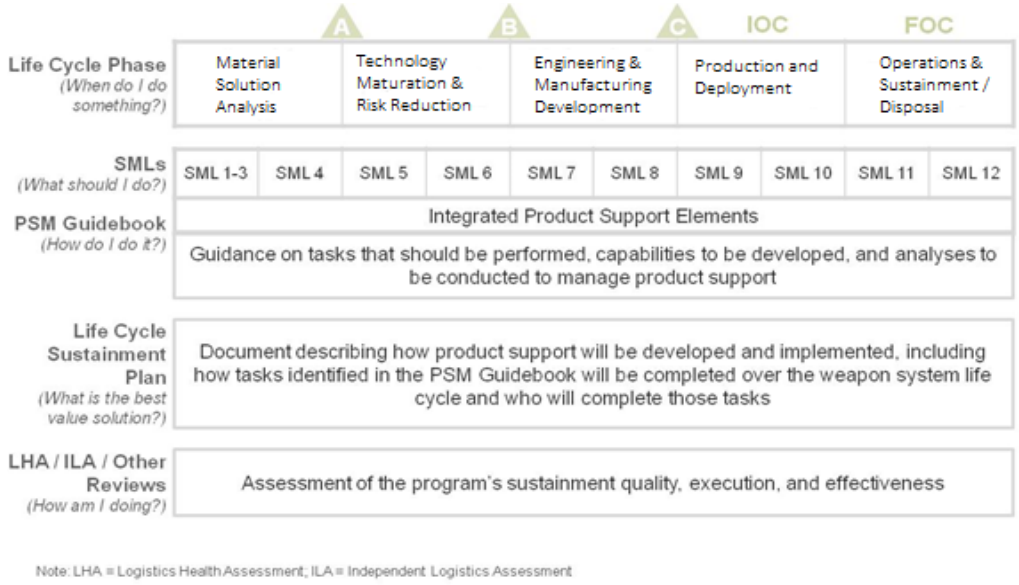
[12] PL 113-66 *The National Defense Authorization Act for Fiscal Year 2014,* Section 803

1.5 Relationship to Policy and Other Guidance

The *PSM Guidebook* aligns with DoDD 5000.01 and DoDI 5000.02. This guidebook is intended to be a desk reference that complements DAU training and other guidance by explaining the PSBM, and illustrates how the PSM should execute the tasks discussed by DoDI 5000.02. It is not intended to provide all the necessary documentation to fully qualify an individual to be a PSM. It recognizes the need for formalized training, experience, and companion documents that are part of the training continuum and product support reference library for PSMs

This guidebook flows from the introduction of product support to the integrated roles and responsibilities of product support stakeholders, management tools, processes, and the major program phase activities associated with the IPS Elements. Each major program phase has a unique set of activities that should be performed to achieve increasing levels of program maturity and readiness. These activities can be aligned with Sustainment Maturity Levels (SMLs)[13], a concept introduced in this guidebook as a thought exercise/best practice to help PSMs determine activities that should be performed and when they should be completed to ensure the program is maturing the support strategy and is prepared to deliver sustainment capability when required.

Figure 3. Graphic Overview of the Guidebook's Structure.


A
B
C
IOC
FOC
Life Cycle Phase
(When do I do something?)
Material Solution Analysis
Technology Maturation & Risk Reduction
Engineering & Manufacturing Development
Production and Deployment
Operations & Sustainment / Disposal
SMLs
(What should I do?)
SML 1-3
SML 4
SML 5
SML 6
SML 7
SML 8
SML 9
SML 10
SML 11
SML 12
PSM Guidebook
(How do I do it?)
Integrated Product Support Elements
Guidance on tasks that should be performed, capabilities to be developed, and analyses to be conducted to manage product support
Life Cycle Sustainment Plan
(What is the best value solution?)
Document describing how product support will be developed and implemented, including how tasks identified in the PSM Guidebook will be completed over the weapon system life cycle and who will complete those tasks
LHA / ILA / Other Reviews
(How am I doing?)
Assessment of the program's sustainment quality, execution, and effectiveness

Note: LHA = Logistics Health Assessment; ILA = Independent Logistics Assessment

The *PSM Guidebook* helps the PSM integrate life-cycle product support management activities and guidance to achieve Warfighter requirements.

Once a system is fielded, the SMLs help the PSM determine what should be done to ensure the support strategy continues to meet the Warfighter needs as circumstances change over time. The specific activities and timing for completion will vary depending on the unique requirements and circumstances of each program and will be determined by the PSM. The PSM should be able to articulate why the fidelity or maturity of the support solution is appropriate for the program at that point in time. As seen in Figure 3, the life-cycle phase identifies when something should be done; the SMLs identify what should be done; and the *PSM Guidebook* helps answer the question "how do I do it?" The result is an ever-maturing support strategy documented in the LCSP. How successful the PSM has been in preparing for sustainment is assessed by an

[13] See **Appendix G – Sustainment Maturity Levels (SMLs)**.

Independent Logistics Assessment (ILA).[14] This overview of the guidebook's structure is shown in **Figure 3**.

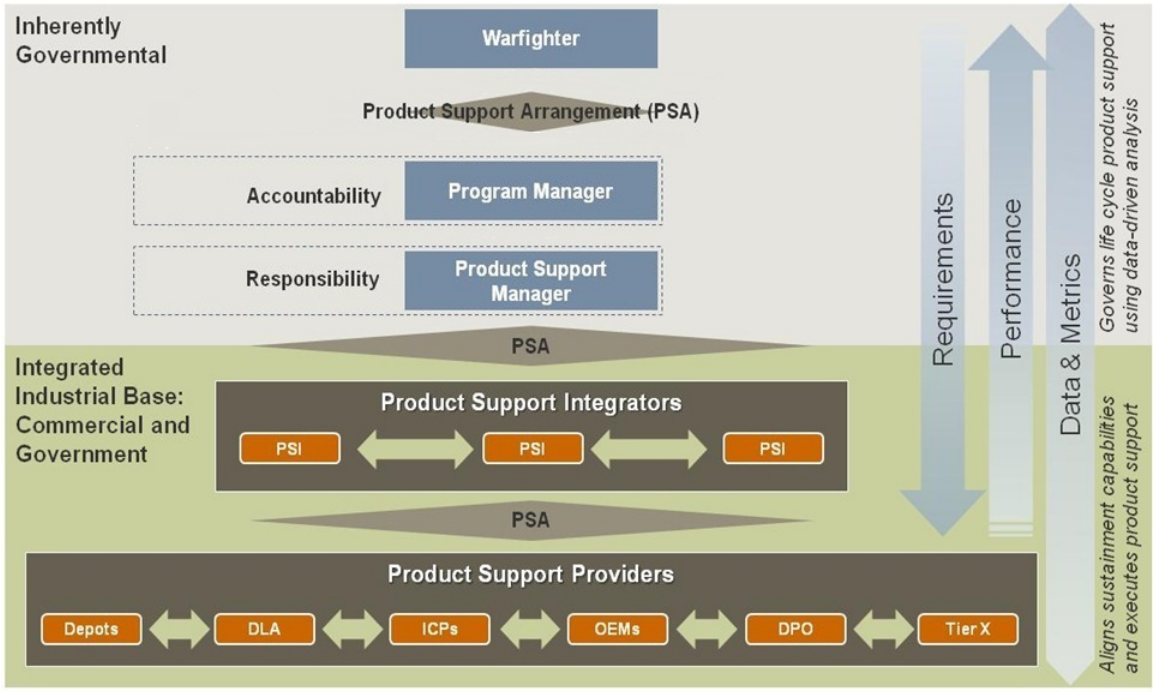
2.0 PSBM, Roles/Responsibilities, PSAs, Product Support Strategy & Implementation

2.1 Product Support Business Model (PSBM)

The PSBM defines the hierarchical framework in which the planning, development, implementation, management, and execution of product support for a weapon system component, subsystem, or system platform will be accomplished over the life-cycle. The PSBM effectively describes the methodology by which DoD ensures achievement of optimized product support through balancing maximum weapon system availability with the most affordable and predictable TOC.

The model provides a clearly delineated description of the roles, relationships, accountability, responsibility and business agreements among the managers, integrators, and providers of product support. Those roles and responsibilities, consistent with their level of accountability and responsibility, are portrayed in **Figure 4**.

Figure 4. Framework of PSBM Roles and Responsibilities.



The PSBM underscores the PSM's role as the Warfighter's principle product support agent, responsible for integrating PSIs to achieve Warfighter requirements.

[14] PL 112-81 *The National Defense Authorization Act for Fiscal Year 2012*, Section 832

2.2 Roles & Responsibilities

The upper tier of the framework depicted in **Figure 4** designates the inherently governmental functions of developing and managing the overall product support strategy across the life-cycle, beginning with the Warfighter's performance requirements. The PM is assigned LCM responsibility and is accountable for the implementation, management, and oversight of all activities associated with development, production, sustainment, and disposal of a system across its life-cycle. As part of this, the PM has the responsibility to develop an appropriate sustainment strategy to achieve effective and affordable operational readiness consistent with the Warfighter resources allocated to that objective. The PM's responsibilities for oversight and management of the product support function are typically delegated to a PSM, who leads the development, implementation, and top-level integration and management of all sources of support to meet Warfighter sustainment and readiness requirements. This top-level Government role is crucial to the delivery of not only system level, but also portfolio and enterprise level capabilities across the spectrum of defense resources.

The framework's lower tier portrays the product support implementing agents. Consistent with the model's emphasis on a performance/outcome-based product support approach, there may be a requirement for one or more PSIs who are chartered with integrating sources of support, public and private, defined within the scope of their implementing arrangements, to achieve the documented outcomes. There is a clear need for entities (public or private) assigned the responsibility for delivering performance outcomes to be endowed with authority to integrate, manage, and provide oversight over the lower-level support functions that, in combination, achieve the specified outcomes.

2.2.1 Role of the PSM

The principal duties of the PSM are as follows.

1. Provide weapon system product support subject matter expertise to the PM for the execution of the PM's duties as the Total Life-Cycle Systems Manager.
2. Develop and implement a comprehensive, outcome-based product support strategy. The product support strategy should be designed to maximize value to the DoD by providing the best possible product support outcomes for the Warfighter at the lowest O&S cost. Documented in the LSCP, the strategy is generally expressed in terms of weapon system Materiel Availability (A_M), materiel reliability, and O&S cost.
3. Promote opportunities to maximize competition and small business participation at the appropriate tiers while meeting the objective of best value, long-term outcomes to the Warfighter. Competition, where there is more than one available source, is a means to an end (i.e., obtaining supplies and services at the best value to the Government). Tradeoffs between the benefits of long-term relationships and the opportunity for cost reductions through the competitive processes should be considered together with associated risk.
4. Leverage enterprise opportunities across programs and DoD Components. Enterprise strategies are a priority where the component, subsystem, or system being supported is used by more than one Component. Product support strategies should address a program's product support interrelationship with other programs in their respective portfolio and joint infrastructure, similar to what is performed for operational interdependencies.
5. Use appropriate predictive analytical tools to determine the preferred product support strategy that can improve material availability and reliability, and reduce O&S cost. Analytical tools can take many forms, such as Analysis of Alternatives (AoA), Supportability Analysis, Reliability Growth Analysis, Core Logistics Analysis/Core Depot Assessment, and BCA (including cost-benefit analysis, as outlined in Office of Management and Budget Circular A-9, and the *DoD BCA Guidebook*). The choice of tools depends upon what is being evaluated and the stage of the program's life-cycle. These tools are used to help identify the best possible use of available DoD and industry

resources at the system, subsystem, and component levels by analyzing all alternatives available to achieve the desired performance outcomes. Additionally, resources required to implement the preferred alternative should be assessed with associated risks. Sensitivity analyses should also be conducted against each of the IPS Elements and tracked to determine those IPS Elements where marginal changes could alter the preferred strategy.

6. Develop appropriate PSAs for implementation. These arrangements should take the form of performance-based agreements, memorandums of agreements, memorandums of understanding, and partnering agreements or contractual agreements with PSIs and PSPs, as appropriate. Development and implementation of PSAs should be a major consideration during strategy development to assure achievement of the desired performance outcomes.
7. Working in concert with the PM, users, resource sponsors, and force providers, adjust performance levels and resources across PSIs and PSPs as necessary to optimize implementation of the strategy and manage risk based on current Warfighter requirements and resource availability.
8. Ensure that PSAs for the weapon system describe how such arrangements will ensure efficient procurement, management, and allocation of Government-owned parts inventories in order to prevent unnecessary procurements of such parts.
9. Document the product support strategy in the LCSP. The LCSP describes the plan for the integration of sustainment activities into the Acquisition Strategy and operational execution of the product support strategy. The PSM prepares the LCSP to document the plan for formulating and executing the product support strategy so the design and every facet of the product support package (including any support contracts) are integrated and contributes to the Warfighter's mission requirements. The LCSP is updated to reflect the evolving maturity of the product support strategy and associated arrangements at a minimum prior to each change in the product support strategy or every five years, whichever occurs first.
10. Conduct periodic product support strategy reviews. The product support strategy evolves with the maturation of the weapon system through its life-cycle phases. At FRP, the LCSP should describe how the system is performing relative to the performance metrics and any required corrective actions to ensure the metrics are achieved. Reviews and revalidations of the strategy and underpinning analysis should be performed at a minimum of every five years or prior to each change in the strategy to ensure alignment across system, subsystem, and component levels in support of the defined best value outcomes. The PSM's reassessment should evaluate potential opportunities for evolving toward an enterprise portfolio approach (i.e., across platforms; inter-Service) where opportunities for leveraging commonality and economies of scale exist. In all situations, the reassessment should consider opportunities to make better use of industry and DoD resources.[15]

All PSMs assigned to major programs must satisfy certain training, certification, and experience requirements. See **Appendix D – PSM Training, Certification & Experience Requirements**.

2.2.2 Role of the PSI

The PSI's role is assigned within the scope, direction, and oversight of the PSM. (Note that a PSI is assigned at the discretion of the PSM. Not all programs will require a PSI. Some programs may use multiple PSIs). PSIs accomplish their product support role through use of one or more PSPs. Integrators are responsible for the activities and output of one or more PSPs within a specific product support element or across product support elements. There may be a system-level PSI that manages subsystem level PSIs. A PSI may also perform the function of a PSP. A PSI may be either a Government or commercial entity.

[15] Title 10 U.S.C. § 2337 – Life-Cycle Management and Product Support

2.2.3 Role of the PSP

The PSPs are assigned responsibilities to perform and accomplish the functions represented by the IPS Elements which, per the BCA process and consistent with statute and policy, comprise the range of best value or statutorily assigned workloads that achieve the Warfighter support outcomes. This can be done at the program, portfolio, or enterprise level.

2.3 Product Support Strategy & Implementation

A product support strategy encompasses the means by which defense system sustainment is to be accomplished. It is not a one-time decision made early in the system life and executed in the same form throughout the life-cycle. It is evolutionary, since the requirements, capabilities, competencies, operational mission, and material condition of defense systems change over time. The PSM must be cognizant of the baseline conditions and assumptions when assessing and selecting the appropriate strategy, monitoring its performance, and when revising the strategy as circumstances change.

2.3.1 Product Support Strategy Alternatives

A support strategy alternative is simply one of any number of options for providing support as represented by Figure 2 and further explained by the example represented by Figure 10. DoD weapon systems are increasingly an integration of discretely developed and very sophisticated subsystems and components. While a system comprises a war fighting capability to a combatant commander, from a sustainment perspective, it is comprised of separately designed and integrated subsystems such as propulsion, electronics, or fire control. Each of these has an inherent sustainment "tail" that ensures its readiness and availability which, in turn, achieves the operational readiness of the system. Accordingly, a product support strategy must consider the optimum approach for the level of support as well as the scope of support.

Product support may be categorized into three levels: system, subsystem, and component, level.

- A "system" is defined as a weapons platform, such as a tactical aircraft, a main battle tank, or guided missile destroyer. (A system may house or support another system managed by a different PM.)
- A "subsystem" is an integrated critical subsystem that is part of a warfighting platform, such as an aircraft engine, a ground tactical vehicle fire control system, or on-board radar.
- A "component" is generally defined as an item that can be readily removed and replaced. Components can be repairable assemblies or a commodity item requiring little or no repair, such as aircraft tires.

While every item on a weapon system will be supported, the degree of integration in the outcome based solution is dependent on many factors. In selecting the level of support to be provided, the PSM must weigh the financial and non-financial benefits of a highly integrated approach (e.g., at the system level) to the more fragmented but tightly focused approach available at the subsystem or component levels. Outcome based strategies focused on optimizing system level availability require more complex development.

The range of product support is generally defined by the scope of the IPS Elements comprising the support strategy. For example, many of the component level support strategies are narrow in scope, encompassing primarily supply support activities. Conversely, most system level strategies are much broader in scope, and include the majority of the IPS Elements. The range of product support is primarily determined by the desired level of service for the component, major subsystem, or system and the desired outcomes. For example, if the desired outcome for an Auxiliary Power Unit (APU) is "availability at retail inventory," then the functions necessary to ensure that availability includes Supply Chain Management (SCM), distribution, maintenance and repair, and some level of sustaining engineering. PSMs should give careful consideration to the appropriate range of support to ensure there is consistency with the level of support and the desired performance outcomes.

2.4 Product Support Arrangements

The foundational documents that enact and implement the relationships across this framework are PSAs. It begins with the Warfighter (user) defined performance requirements that are initiated through the Joint Capability Integration and Development System (JCIDS) Inclusion of support requirements in the CDD and CPD are critical for an effective and affordable support solution in sustainment. The PSM (acting on behalf of the PM) incorporates the appropriate needs and constraints in arrangements with PSIs (or directly with PSPs when appropriate). PSIs in turn, ensure that the necessary performance requirements to meet their arrangements are properly passed to the PSPs, who accomplish the product support activities. PSAs are used to ensure performance expectations of all product support entities are clearly articulated.

PSAs require defined outcomes and differ from a "best effort" approach typical of some DoD organic support processes. PSAs provide a clear delineation of performance outcomes, corresponding support requirements, and the resources required to achieve both; they create a clear understanding of the outcomes and the commitments required to achieve those outcomes among all stakeholder parties.

A **PSA** is a contract, task order, or any type of agreement or non-contractual arrangement within the Federal Government, for the performance of sustainment or logistics support required for major weapon systems, subsystems, or components. The term includes arrangements for any of the following:

- Performance-Based Logistics
- Sustainment support
- Contractor logistics support
- Life-Cycle product support
- Weapon systems product support

- Properly constructed PSAs include:
- Clear and understood cost, schedule, and performance objectives and metrics to achieve documented Warfighter requirements
- Roles and responsibilities
- Conflict adjudication procedures
- Reliability, availability, maintainability, supportability, and cost improvement targets
- Data sources and collection frequency
- Arrangement terms and conditions
- Planned flexibility
- Unforeseen circumstances identification and management
- Meeting cadence

- Performance reviews
- Incentives and penalties

3.0 Life-Cycle Sustainment Management Tools

3.1 Sustainment Maturity Levels (SMLs)

Developing and fielding the product support package evolves over time. Support packages are dependent on variables such as operating doctrine, changes in technology, as well as commercial and Government repair capabilities. As a result, a consistent metric to measure the maturity of the implementation process is useful in conveying the progress across the various communities. The SML concept, which may be used by the PSM to assess the program's progress in implementing the product support strategy, including the design and the resultant Product Support Package to achieve the sustainment metrics. The SML concept addresses the full range of support options, from traditional organic based to full commercial based product support without prescribing a specific solution. In addition, the SML approach can be applied across major sub-systems to provide a common, consistent, repeatable means of articulating and understanding the product support package maturity.

Achieving the levels along an indicated timeline helps the PSM evolve the program's product support approach to achieve the best value support solution. Achieving the "up front" levels will help in designing support actions to reduce TOC and ensure the product support package is being developed using supportability analysis concepts such as Failure Mode, Effects, and Criticality Analysis (FMECA), Fault Tree Analysis (FTA), Reliability Centered Maintenance Analysis (RCMA), Level of Repair Analysis (LORA), and Maintenance Task Analysis (MTA). Using an SML construct can help ensure that the product support strategies can be continuously improved based on actual data collected during the testing and operations phases.

3.2 Independent Logistics Assessment (ILA)

The PSM is encouraged to use the criteria in their Component ILA guidance and the *OSD Logistics Assessment (LA) Guidebook*[16] as a guide to maximize the likelihood that the product support organization will achieve the Warfighter-required outcomes. Each row of the criteria in the OSD guidebook is phrased as a leading statement to inspire critical thinking and investigation and is not intended to simply be a compliance statement.

The LA closely aligns with the IPS Elements, with each element assessed and given an individual score. Note, however, that two IPS activities, Program Support Budgeting and Funding, and Environmental Safety and Occupational Health (ESOH), are assessed independently of their IPS Elements since they are heavily dependent on Subject Matter Experts (SMEs) from outside of the product support organization and have assessment criteria distinctly different from the other activities comprising their IPS Elements.

3.3 Metrics

A key component of any PBA is the establishment of well understood and achievable metrics[17]. What constitutes performance must be defined in a manner in which the achievement of required outcomes can be tracked, measured, assessed, and revalidated as required. The identification of top-level metrics achieves this objective. The PM works with the user or Warfighter to establish system performance needs and then works with the PSI to fulfill those needs through documentation of the requirements, including appropriate metrics, in PSAs. An effective product support strategy implementation depends on metrics that accurately reflect the user's needs and can be an effective measure of the PSI and PSP performance.

[16] See DoD (Independent) Logistics Assessment (ILA) Guidebook (https://www.dau.edu/tools/t/Logistics-Assessment-Guidebook)

[17] DoDI 5000.02 *Operation of the Defense Acquisition System,* Enclosure 6

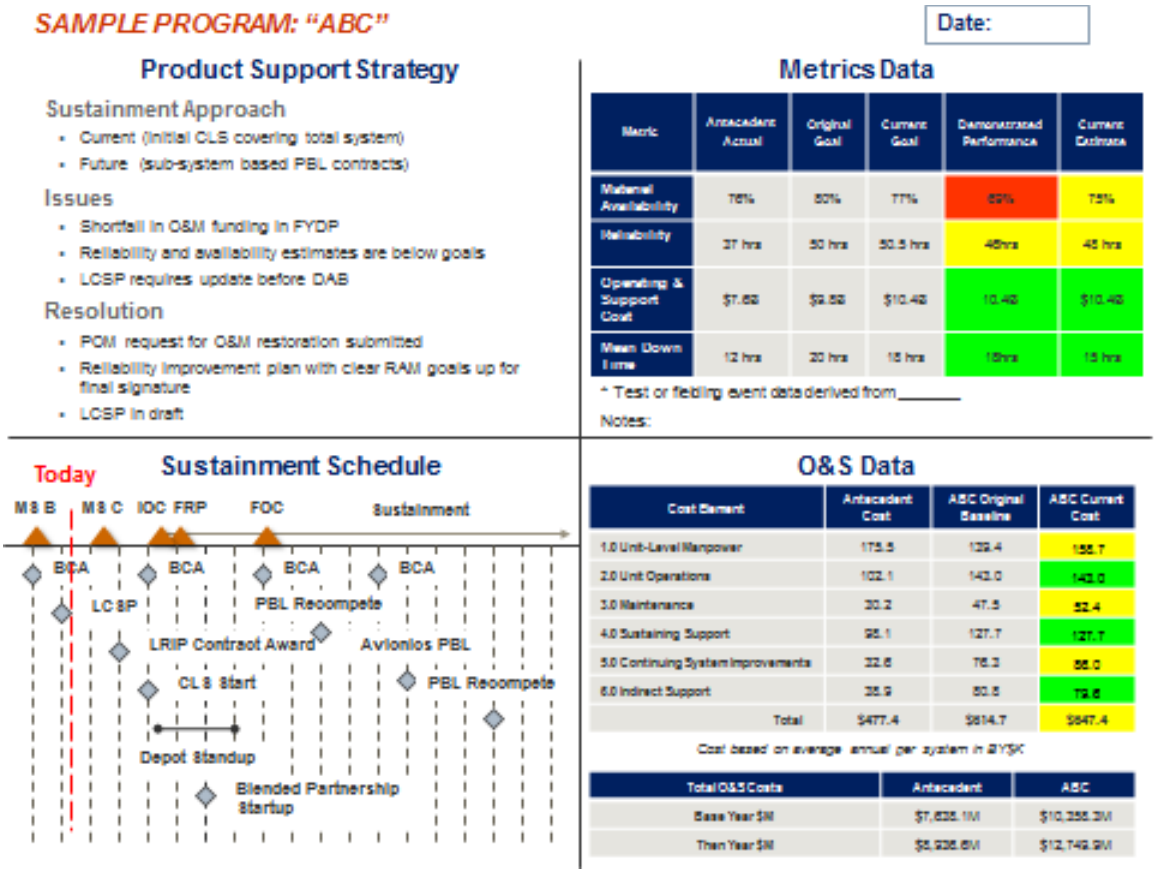
Linking the program's sustainment metrics to existing Warfighter measures of performance and reporting systems is essential. Many existing logistics and financial metrics can be related to top-level Warfighter performance outcomes. Although actual product support strategies may delineate metrics at levels lower than the Warfighter top-level measures (e.g., system availability), it is important that the initial identification of performance outcomes be consistent with the sustainment metrics. These measures are applicable to all product support strategies and are discussed in detail later in this document.

The sustainment metrics are a powerful tool for the PSM to create an aligned product support strategy. While the JCIDS metrics are mandatory, programs should have additional, subordinate metrics aligned to the JCIDS metrics to ensure Warfighter system requirements are met. Metrics that the PSM might use are provided in **Appendix B – Typical Supporting Performance Metrics**. In all cases, the program metrics must be integrated to communicate a shared understanding of expectations across stakeholders and to measure success in achieving the A_M outcome. Each stakeholder must understand how their performance contributes to the overall system A_M. While the metrics management process described below starts prior to program initiation, it is a repetitive process that is applied in all life-cycle phases. The main difference is that later in the life-cycle, metrics are analyzed at a greater level of detail based on actual performance rather than estimates created early in system life. Developmental test and operational test results for supportability provide the earliest actual vs. estimated data.

The sustainment Key Performance Parameter (KPP) is Availability (Availability consists of two components: A_M and operational availability). Reliability and O&S costs are the two supporting sustainment Key System Attributes (KSAs).[18] These requirements, along with Mean Down Time, align with recent Joint Staff actions and establish a single set of sustainment metrics throughout a program's life-cycle. Goals for these materiel readiness outcomes should be established early in the material solution analysis and then carried through as program baseline goals until system retirement. These metrics are reported in the top right quadrant of the Sustainment Chart shown in Figure 5. Status towards these goals should be reported at Program Reviews. In addition, data on these four metrics for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) programs must be reported quarterly to OSD using the Defense Acquisition Management Information Retrieval (DAMIR) system. Instructions for using the Sustainment Chart are found in **Appendix C – Sustainment Chart & Instructions**.

Figure 5. Sustainment Chart.

[18]CJCSM 3170 *Manual for the Operation of the JCIDS*



This chart provides a ready reference for executive decision makers to use when reviewing a program's product support organization, and is mandatory at all programmatic reviews.

One of the most critical elements of an effective product support strategy is making sure metrics are appropriate for the operational role of the system and ensuring synchronization of the metrics with the scope of responsibility of the support providers. The PM and PSM are responsible for delivering a product support solution that satisfies the requirements mandated in the CDD and CPD, which are then delegated to PSI(s) and PSP(s) as appropriate via PSAs and associated metrics. To assure accountability, there must be consistency between the defined metrics and the scope of support responsibilities. If a PSI does not perform or manage all functions contributing to materiel/operational availability, consideration must be given to identifying and tailoring other appropriate supporting metrics for which the PSI may properly be held accountable. While objective metrics should form the bulk of the evaluation of a PSI performance, some elements of product support requirements might be more appropriately evaluated subjectively by the Warfighter and the PM team. This approach allows some flexibility for adjusting to potential support contingencies. Ultimately, measures of readiness and supportability performance must be balanced against cost and schedule requirements, as well as other program, Service or DoD priorities.

3.3.1 Using Metrics Across the Lifecycle

Sustainment requirements and metrics must be sub-allocated into lower levels of indenture to specific subsystems and equipment. These requirements are then used to develop the specific support strategies and maintenance plans for both the system and its logistic support system. The requirements that drive supportability must be inserted into acquisition documents and the PSM must ensure the appropriate program documentation, and planning, programming, and budgeting actions are put into place to develop, field, and sustain the product support package.

Technical Performance Measures (TPMs) must be put in place to monitor the progress of the design in relationship to supportability. TPMs should be jointly developed by the SE and product support teams at the start of the program.

Special coordination and emphasis is required with the engineering and test communities to ensure the proper design features are included in design planning, system specifications for sustainability[19] and reinforce product support goals and are assessed during test. The PSM must also ensure the SE Plan (SEP) includes the processes to achieve the required sustainment performance along with the contractor reporting requirements. The Test and Evaluation Master Plan (TEMP) and other testing documentation must include the means to verify that the performance estimates including the sustainment metrics and vital logistics support elements (e.g., training, support equipment, maintenance and operator publications, spares, etc.) are adequate to achieve stated thresholds. Specific PSM efforts during system development and fielding include:

- Prioritizing metrics for management attention (including developing risk mitigation strategies and options for each, as well as identifying when the options have to be implemented, if the estimates indicate the thresholds are not likely to be met)
- Ensuring sustainment requirements are addressed during the AoA and included in acquisition documents such as the Acquisition Strategy and LCSP
- Establishing detailed measurement and evaluation criteria for each sustainment metric (including any key enabling technologies) to validate/verify performance as well as provide information about sustainment risk and mitigation, as the development and testing continue[20]
- Participating in design reviews and monitoring sustainment metrics estimates based on the evolving design process and prototyping to help provide confidence the system will achieve the sustainment objectives
- Participating in test reviews and monitoring the maturation of design suitability and associated product support metrics including product support elements (e.g., training, support equipment, maintenance and operator publications, spares, etc.) throughout test and deployment
- Tracking the provider's performance during development to ensure there are no performance anomalies when the system is fielded

Finally, the results of the PSM's efforts during acquisition are listed in the sustainment chart shown in Figure 5. It is used to strengthen sustainment governance by providing senior management visibility of key sustainment factors to help ensure the PM's sustainment strategy is meeting the Warfighter materiel readiness objectives with long-term affordability considerations.

3.3.2 Using Metrics to Adjust Product Support

Once the system is fielded starting at Low Rate Initial Production (LRIP) and Initial Operational Test and Evaluation (IOT&E), actual performance tracking enables determining whether corrective actions and adjustments are needed to the design (e.g., reliability, maintainability) and to the product support package to achieve Warfighter requirements and to control O&S cost[21]. This is accomplished by continually comparing performance against requirements, defined as thresholds; and expectations, defined as objectives. Actual equipment and support performance data and costs will be used, improving product support strategies to meet the users' requirements. This includes updating the variance analysis that examines actual versus predicted cost and performance, supply chain processes based on actual values to help balance logistics support through a thorough review of readiness degraders, maintenance data, maintenance capability, and support process implementation. For example, reliability data

[19] Title 10 U.S.C. §139b, Paragraph (b)5(A)(ii-iv)

[20] PL 112-81 *The National Defense Authorization Act for Fiscal Year 2012,* Section 832, Paragraph 7

[21] PL 112-81 *The National Defense Authorization Act for Fiscal Year 2012,* Section 832, Paragraph 6

captured through the maintenance process can be compared, through the use of reliability modeling, to specified system reliability. The critical reliability drivers can then be submitted for analysis to determine the most cost-effective mitigation strategies.

3.4 Enterprise Synergies & IPS Elements

3.4.1 Enterprise Synergies

"Enterprise Synergies" refers to the ability to leverage the efforts of other programs or portfolio of programs as well as existing capabilities for sub-systems and components (i.e., non-developmental items). The PSM's challenge varies throughout the life-cycle and grows more complex over time as fleet configurations change due to varying ages, blocks, and modifications of the systems being managed. Other systems and functional organizations are also evolving in parallel with the PSM's, providing opportunities for the PSM to identify and take advantage of synergistic relationships across the enterprise. For example, the PSM of the B-1 might take advantage of the C-130 APU modernization program to upgrade secondary power without investing separately in a stand-alone, B-1 upgrade. This would create economies of scale in procurement of the system upgrade, consolidate and add efficiency to spending for SCM, and accelerate the learning curve for installation and maintenance. Each of these benefits would result in improvements to the Warfighter and minimized LCC. Enterprise synergies can be achieved through various methods.

- Design joint systems with joint supply chains to improve performance and achieve cost benefits of common processes.
- Use shared IPS Element expertise whenever possible, rather than standing up separate organizations, to develop deep and broad expertise in tasks such as sustaining engineering, supply support analysis, and maintenance management.
- Use common IPS Element hardware, software, and processes where possible (i.e., common support equipment) across multiple platforms to achieve economies of scale.

Ultimately, enterprise solutions should be coordinated at the DoD Component- or portfolio-level and leveraged by the PSMs of individual programs, as applicable.

3.5 IPS Elements

Specific synergies and requisite tradeoffs are identified through analysis and management of the IPS Elements. Integration of all elements is critical. PSMs may be tempted to think of the IPS Elements as a set of discrete functions that must each be individually accomplished to manage sustainment, as has often been the case in the past under traditional integrated logistics support management. The PSM must understand how each element is affected by and linked with the others and as such, should adjust them in an integrated fashion to reach the goal of balancing Warfighter requirements for suitability and affordability. For example, if the PSM recognizes that a system is down more often than predicted and, upon further analysis, determines that a key part is wearing out faster than its designed life would indicate, that maintenance personnel are properly trained, and that there is no other subsystem that is causing early part failure, the PSM should examine at least three solution alternatives and combinations of these alternatives.

- Redesigning the part to be more durable
- Changing maintenance procedures to inspect this part more frequently and replace it earlier in its life or overhaul the unit rather than conducting spot repairs if the investment in overhaul results in a positive return on investment
- Buying additional parts

Additionally, other approaches may apply.

- If commercially repaired units are more reliable, investigate whether commercial practices or a teaming arrangement can be applied to the organic Depot

- If a lack of training is resulting in more frequent removals, field the appropriate training teams
- If new or better test and repair equipment is available, and there is a positive return on investment, field the improved equipment

Each of these alternatives will have a different impact on the program and should be evaluated for system availability, reliability, and cost across each IPS Element.

3.6 Business & Variance Analysis

PSMs should base decisions on data and proven analytical techniques to ensure they are made as objectively as possible and should use that analysis to support informed decisions. All major decisions regarding product support strategy development, including assignment of workloads and responsibility for integration of those workloads (PSI delegation) should be informed by unbiased analysis, includes all stakeholders, and accounts for all applicable cost assessed equitably across all alternatives to meet Warfighter requirements. Likewise, the PSM should understand the cause of variances between predicted and actual product support cost and performance. The level of analysis depends on the life-cycle phase, and the purpose and scope of the cost analyses.

3.6.1 Data Quality for All Analyses

Data used for sustainment governance should be obtained from authoritative data sources such as Visibility and Management of O&S Cost (VAMOSC) or Component Enterprise Resource Planning (ERP) tools that, as much as possible, rely on automated data collection. Ideally, these same data sources will be used to populate the consolidated cost figures used in Service and DoD reporting and planning. If this dual use of data is not possible, then any data sources used must be validated to ensure they provide timely, accurate, and usable data that reflects actual program performance.

3.6.2 Product Support Business Case Analysis (BCA)

The Product Support BCA is a structured methodology and document that aids decision making by identifying and comparing alternatives by examining the mission and business impacts (both financial and non-financial), risks, and sensitivities. BCAs may be somewhat different from other decision support analyses through their emphasis of the enterprise wide perspective of stakeholders and decision makers and assessment of the holistic effects impacted by the decision. Other names for a BCA are Economic Analysis, Cost-Benefit Analysis, and Benefit-Cost Analysis. Broadly speaking, a BCA is any documented, objective, value analysis exploring costs, benefits, and risks. The BCA is not intended to mandate a specific type or level of analysis; it should be tailored to the needs of the program and the nature of specific product support decisions. The PSM should identify the appropriate analytical methodology for their program and include in any methodology an assessment of cost, benefits, risk and sensitivity to changes in the available support alternatives.

The BCA should be used to determine how the system will be supported in an integrated fashion across the product support elements. The PSM should document these decisions within the LCSP and should also document any requirements to deviate from the decisions recommended by the BCAs. The PSM should also maintain a complete history of BCAs over the course of the system life-cycle to be able to track decisions and understand how real-world operations are causing deviations from predicted cost and performance through a variance analysis

Specific instructions on the BCA process, product templates, and authoritative data sources are contained in the *OSD BCA Guidebook*. The use of a standard BCA process facilitates the PSM meeting the statutory requirements that stipulate the PSM conduct appropriate cost analyses to validate the product support strategy, including cost-benefit analyses as outlined in the Office of Management and Budget Circular A-94 as well as revalidating the weapon support strategy business case every five years or prior to a major change in the program product support

strategy.[22] It also ensures that the PSM addresses and acts to prevent systemic product support issues. Revalidating the BCA does not mean that the BCA must be completely redone every five years. If the BCA ground rules and assumptions and operating environment have not changed, no errors in the original BCA are uncovered, and the product support solution is performing well, no other action is required. However, if the conditions under which the support solution was implemented have changed or before a new product support solution is implemented, the GR&A should be updated and a new BCA performed.

BCA objectives and approach are dictated to a significant degree by the point at which they are accomplished within the weapon system life-cycle. Acquisition and early operational fielding analysis is primarily used to shape the product support strategy development. Later life-cycle analysis (e.g., for out of production legacy systems) is generally used to assess the current product support strategy.

- **Early life-cycle analysis** is used to determine the best value portfolio of strategic sourcing and support alternatives to address each IPS Element in a program from a set of candidate alternatives. This process is iterative; it evolves and matures as the data, support infrastructures, and availability of support providers and alternatives evolves.
- **Later analysis** is used to identify the best value alternative product support solution vs. the current product support solution and to determine whether a change in product support strategy is beneficial. It is characterized by mature cost, performance, and supportability data and readily available, in-place product support infrastructure(s).

The data, factors, alternatives, and purpose of the BCA evolve consistent with the point at which the analysis is performed within the life-cycle. For example, analysis accomplished concurrent with the approval of a defense system program office at Milestone B is necessarily constrained by the lack of real world performance, supportability (reliability, availability, and maintainability), and cost data, making it highly reliant on analogous data, if available. Also, at Milestone B, there is no in-place organic support infrastructure. The development system is almost entirely reliant on the commercial development Original Equipment Manufacturer (OEM) for support throughout the design, development, and most of the production phase for the program. As a result, there are few “alternatives” available for consideration at this point. However, the value in this initial analysis is to initiate and institutionalize the resources, skills, and process infrastructure to collect, compile, update, and analyze the requisite data as it grows and matures after Milestone B such that any BCA updates will improve the ability of the PSM to identify and compare viable product support strategy alternatives leading up to the point at which sufficient data accuracy and availability will enable a life-cycle decision support strategy analysis. In that context, an initial BCA performed early in development will use the same format and section content as subsequent BCA updates, but will contain much less detail and will reflect placeholders for content as it becomes available.

As a program nears Milestone C analysis using available test and evaluation data, will begin to identify the viable sourcing and support alternatives, and accomplish initial analysis of those alternatives sufficient to develop the scope of the product support framework and the identification of the key performance and supportability outcomes appropriate to the objective system. As organic infrastructures are established the BCA is the primary means by which the PPP and best competency, best value workload sourcing decisions can be implemented.

Given that the product support alternatives vary as the life-cycle evolves, there is no standard set of alternatives for a Product Support BCA, such as “organic,” “contractor,” or “partnership.” For acquisition programs the alternatives, to a great degree, will be refined through the BCA process as it is used to assess options for delivering IPS required for sustainment of the system. The

[22] Title 10 U.S.C. § 2337 – Life-Cycle Management and Product Support

merits of various sourcing and partnering options will be identified as capabilities, infrastructures, and cost, supportability, and performance data are accrued and analyzed.

3.6.3 Product Support & Variance Analysis

PSMs must also ensure that appropriate analyses are performed and predictive and analytical tools used over the course of the weapon system life-cycle. While specific requirements will vary by program, in general, statistical process control tools such as control charts should be used to monitor program trends and keep program processes in control. Likewise, variance between predicted and actual performance and cost must be evaluated periodically to ensure processes are actually achieving required outcomes and to provide opportunities for continuous process improvement within the program.

3.7 Introduction to Supply Chain Management (SCM)

SCM includes but is not synonymous with the Supply Support IPS Element. In its broadest sense, the supply chain touches on almost all of the product support elements. PSMs should be cognizant of their system's supply chain from a logically bounded end-to-end perspective. Typically this means that they should view it as an integrated network that extends from their suppliers' suppliers to their customers' customer and back. This does not mean that the PSM should act as an agent of the prime manufacturer performing sub-vendor management functions. However, he or she should, at all times, hold the prime accountable for the performance of their vendor base. For example, if the PSM manages a system with scarce metals/hazardous material, they might need to maintain situational awareness of the supply chain from the raw material source to the Warfighter to disposal. Conversely, if the PSM manages a system with less stringent requirements, they might need to only understand situational awareness from the Inventory Control Point (ICP) to the Warfighter.

SCM responsibility includes the distribution, asset visibility, obsolescence and counterfeit parts mitigation for weapon system sustainment material. From a Warfighter's perspective, transportation and asset visibility have a substantial impact on high-level sustainment metrics and should be emphasized in the product support strategy. All the skilled labor, advanced technology, and performance of a modern weapon system mean little without the "right part, in the right place, at the right time."

Of special concern to the PSM is the need to constantly look for and implement mechanisms to reduce and streamline the logistics footprint. This may involve continued collaboration with systems engineers but might just as easily involve using existing supply chains that are supporting other systems rather than developing a new supply chain, thereby minimizing redundancy and associated footprint.

3.8 LCSP & Product Support Package Update

System sustainment is enabled by effective planning, development, implementation, and management. To accomplish this, the PM and PSM must plan for the long term supportability and sustainment through the development and application of a performance-based life-cycle product support strategy. The plan for implementing the strategy seamlessly spans the entire life-cycle and is spelled out in the LCSP. The LCSP is an evolutionary document begun during the Materiel Solution Analysis (MSA) phase as a strategic framework for delivering optimal sustainment at minimal LCC. The basis for developing a new system's product support strategy should be the existing system/capability that is to be replaced. The shortfalls or limitations of the existing system's design and support strategy must be incorporated into the new system's design and support strategy. On this baseline the sustainment requirements (supportability KPPs and KSAs) and concise product support strategy will satisfy operational, statutory and regulatory sustainment requirements, identify intellectual property requirements, and inform the development of affordability caps and goals and should cost initiatives for sustainment. It evolves into an execution plan for how sustainment is applied, measured, managed, assessed, and reported after system fielding. By Milestone C, it should contain details on how the program is fielding IPS Elements to meet readiness targets, sustain system performance capability threshold

criteria, mitigating O&S cost, reducing the logistics footprint, mitigating corrosion and material degradation risk, and complying with environmental and other logistics related statutes and regulations.

The document serves as a repository of the issues, analysis, and decisions associated with developing and executing a product support solution. Continuously updated by the PSM organization, the LCSP is a single source of integrated data for both day-to-day and strategic decisions. The LCSP helps to ensure the coordinated actions across a wide organizational and stakeholder range are coordinated. The LCSP is one of the key acquisition documents and should align with the Acquisition Strategy, SEP, Program Protection Plan, TEMP, Cost Analysis Requirements Document, and other key program documentation.

While the PSM should update the LCSP as needed when the sustainment strategy or operating environments change, the PSM should work toward officially updating the LCSP for any Post-IOC Sustainment Reviews, at a minimum every five years or when:

- Subsequent increments are approved and funded to reflect how the support strategy will evolve to support multiple configurations
- Significant changes are required to the product support package to achieve the objective sustainment metrics, including major support provider changes

The planning outlined in a LCSP is implemented through the system's Product Support Package. The Product Support Package must evolve to reflect changes in the outcomes required by the sustainment strategy. The PSM should take corrective action if the planned Product Support Package does not align with the LCSP. Corrective actions can range from: modifying supply chain functions, renegotiating PSAs, restructuring teams that are accomplishing IPS Element actions, adjusting the Product Support Package to acquire new/better capabilities to redesigning the system. Regardless of the path, the LCSP needs to be adjusted to convey changes in program direction.

3.9 Funding Alignment

For a product support strategy to succeed, a PSM must ensure it is correctly and adequately funded. It is important to align funding appropriations with support requirements. Typically, acquisition phase product support is funded out of Research, Development, Test, and Evaluation (RDT&E) and Procurement appropriations. As the system transitions to operational use, support is typically funded from the Operations and Maintenance (O&M) appropriation. PSMs should work to identify O&M funding requirements early prior to operational use to ensure adequate planning and budgeting of sustainment funds once the system has been fielded. As the system evolves into the O&S phase of its life-cycle, it may be necessary to include Procurement and RDT&E funding for necessary modifications and upgrades to the system to prevent degradations in performance and/or to mitigate rising cost for sustainment as the system ages. Each Program typically has a group of Business Financial Managers (BFMs) who track funding and funding alignment. The PSM should endeavor to meet with program BFMs on a periodic basis to maintain situational awareness and oversight on all appropriations affecting platform support. In addition, the PSM should work with the BFM community to ensure the program of record reflects the financial resources required for support and sustainment of the weapon system.

4.0 Developing a Product Support Strategy

4.1 Introduction

Figure 6. DoD Product Support Strategy Process Model.

The DoD Product Support Strategy Process Model provides a ready reference to the iterative 12 steps for defining and implementing product support strategies.

Programs may change their weapon system product support strategy over their life-cycle as they transition from IOC to a fully fielded and mature system and ultimately to retirement. The development of, or revision to, a product support strategy adheres to a logical methodology captured in the 12-step model depicted in **Figure 6**.

The Life-Cycle Product Support Strategy Process Model represents the major activities required to implement, manage, evaluate, and refine product support over the life-cycle. It is not a one-time process, but rather a continuing, iterative process in which the sustainment of a system (or systems) is adapted and evolved to optimally support the needs and requirements of the Warfighter in an effective and affordable manner. The Product Support Strategy Process Model follows.

4.2 12-Step Product Support Strategy Process Model[23]

4.2.1 Integrated Warfighter Requirements & Support

Translate system operational requirements into the sustainment strategy that will deliver those requirements. The objective of Product Support is to develop, enable, and execute a sustainment

[23] For a more detailed explanation of how to use the 12-step process to develop and implement performance-based product support solutions, see the *DoD PBL Guidebook* (https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook)

strategy that will deliver optimum operational readiness to the Warfighter, consistent with Warfighter requirements, at an affordable, best value cost. Warfighter requirements are expressed in operational terms. Those requirements must be interpreted and translated as needed into sustainment objectives that will drive the achievement of those outcomes.

An effective outcome based strategy implementation begins in the JCIDS process by focusing capabilities needs on overall performance and linking supportability to performance.

Understanding Warfighter requirements in terms of performance is an essential initial step in developing a meaningful support strategy. The PSM team consults with the operational commands and organizations that support the war fighting combatant commanders. The operational commands are generally PM's primary customers. Their Warfighter capability needs are translated into requirements. The metrics are derived from the requirements to drive outcomes that will serve as the primary measures of support provider performance. Supportability requirements should also be a KPP consideration or a testable performance metric.

Understanding Warfighter requirements is not a one-time event. As scenarios change and the operational environment or funding profiles evolve, performance requirements may also evolve, leading to changes in the suitability requirements which in turn drive supportability strategy and outcome based sustainment methodology. Thus, meeting Warfighter needs and remaining in close alignment with Warfighter requirements and logistics personnel are essential and continuous processes for the PSM.

To achieve this needed flexibility, product support strategies should be implemented via PSAs that specify the roles, responsibilities, duration of support, resource commitments, and any specified support or performance outcomes and the corresponding metrics sufficient to achieve the operational requirements. Ideally, the product support strategy will be aligned across various tiers of support and operations tempos.

4.2.2 Form the PSM Integrated Product/Process Team (IPT)

Form the PSM team that will develop, implement, and manage product support. The PSM is charged with the responsibility to plan, develop, implement and execute the product support strategy. Product support encompasses a range of disciplines, including logistics, requirements, financial, contracts, legal, and engineering.

Although the PM is the life-cycle systems manager, the PSM is responsible to the PM for the life-cycle product support management. Effective product support strategies require the participation and consensus of all stakeholders in developing the optimum sustainment strategy. The IPT team, led by the PSM, may consist of Government and private-sector functional experts and should include all appropriate stakeholders including Warfighter representatives, as shown in the notional IPT depicted in **Figure 7**. However, it is vital that members are able to work across organizational boundaries. Teambuilding to achieve a system orientation focused on integrating support across the IPS Elements to achieve Warfighter required performance is critical.

Figure 7. Product Support IPTs.

Product Support IPTs should be cross-functional and include the Warfighter.

The structure of the team may vary depending on the maturity and the mission of the program. The PSM must consider where the system is in the life-cycle, understand what major decision points or events are approaching, and ensure the correct representatives on the team to provide useful information to the decision makers for the program to move forward through the life-cycle successfully.

IPT membership will typically include a program office "core" team who has a daily responsibility to plan, develop, implement, and oversee the product support strategy; the core team will be supplemented, often on an ad hoc basis, by other stakeholders and SMEs as needs arise. After the IPT is organized, the members establish their goals, develop plans of action and milestones (documented in an approved IPT Charter), and obtain adequate resources.

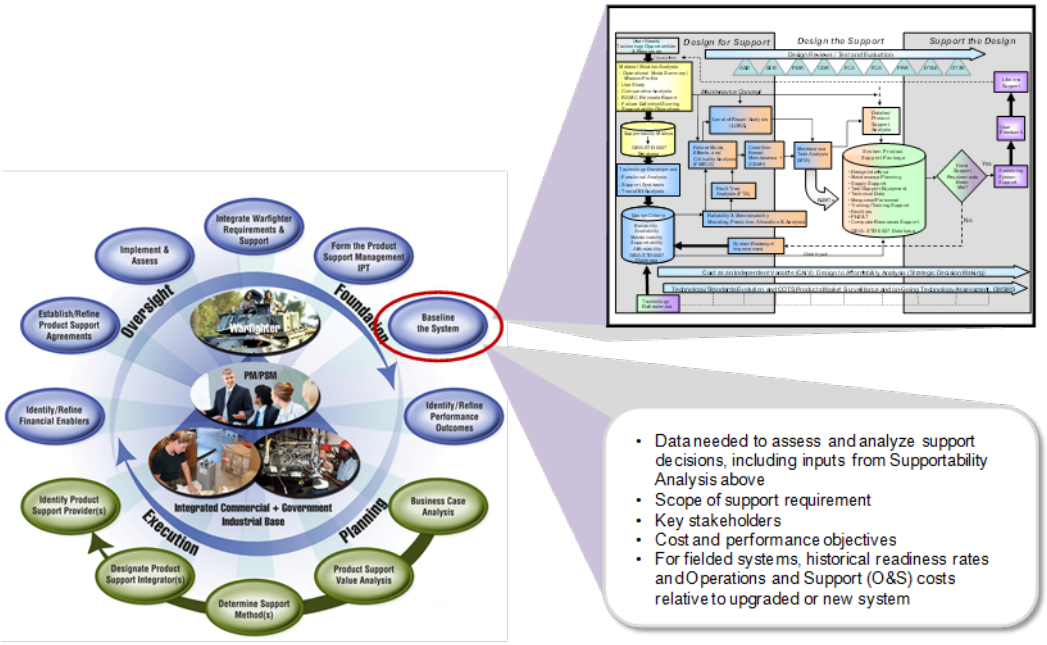
The Product Support Management IPT could include representatives from a component command headquarters and logistics representatives from supply, maintenance, and transportation staffs. It could also include representatives from operational commands or defense agencies, as well as engineering, technical, procurement, comptroller, information technology organizations, and contract support. Depending on the stage of the life-cycle, the team could also include the PSI(s) and key PSP(s). After the team is organized, the members establish their goals, develop plans of action and milestones, and obtain adequate resources. In addition to assisting the PM/PSM in developing, refining, and implementing the product support strategy, the Product Support Management IPT also ensure consideration, throughout support strategy design and development, of all factors and criteria necessary to achieve a best value strategy that leverages the best capabilities of the public and private sectors to meet Warfighter performance, readiness, and availability requirements at the lowest LCC.

4.2.3 Baseline the System

Collect the data, or begin data collection for new systems, that will be needed to assess and analyze support decisions, including inputs from engineering and supportability analyses. This

data includes such things as reliability, maintainability and diagnostics predictions, FMECA, Failure Reporting and Corrective Action System (FRACAS), LORA, MTA, RCMA, and other key maintenance planning tasks, as well as Reliability, Availability, and Maintainability (RAM), and LCC analyses.

Figure 8. Designing the System Baseline for Support.


Design for Support
Design the Support
Support the Design
Integrate Warfighter Requirements & Support
Form the Product Support Management IPT
Baseline the System
Identify/Refine Performance Outcomes
Business Case Analysis
Product Support Value Analysis
Determine Support Method(s)
Designate Product Support Integrator(s)
Identify Product Support Provider(s)
Identify/Refine Financial Enablers
Establish/Refine Product Support Agreements
Implement & Assess
Warfighter
PM/PSM
Integrated Commercial + Government Industrial Base
Foundation
Planning
Execution
Oversight
Data needed to assess and analyze support decisions, including inputs from Supportability Analysis above
Scope of support requirement
Key stakeholders
Cost and performance objectives
For fielded systems, historical readiness rates and Operations and Support (O&S) costs relative to upgraded or new system

Baselining the system helps PMs identify the difference between existing and desired performance requirements to develop an effective support strategy.

Defining and documenting the system baseline answers four key questions.

1. What is the scope of your support requirement?
2. Who are the key stakeholders?
3. What are your cost and performance objectives?
4. For fielded systems, what are the historic readiness rates and O&S cost relative to the upgraded or new system?

The PM needs to identify the difference between existing and desired performance requirements to develop an effective support strategy, as shown in **Figure 8**. Accordingly, the PM identifies and documents the current performance and cost baseline. The life-cycle stage of a program determines the scope of a base lining effort. For new programs with no existing product support infrastructure, the baseline should include an examination of the cost to support the replaced systems. If there is no replaced system, LCC estimates should be used. For new systems, the business model for supporting the product demonstrates its risks and benefits as part of the SE process. This proof of concept for the support solution is part of the EMD phase. For existing systems, the baseline assessments are the basis for BCA of the various product support approaches. It is essential to determine the sustainment and readiness performance history and associated O&S cost, so actual data should be used for fielded systems.

The process of developing the system baseline is to identify all of the information known about the system to include performance, support, reliability, maintainability, and cost data. A robust Integrated Data Environment (IDE) should be initiated (or accessed) as a fundamental

component in the support strategy development or revision process. This stage of the process also provides an essential linkage to a variety of SE and life-cycle logistics efforts to ensure a system is designed with supportability in mind, including key inputs from Supportability Analysis activities. These include IPS activities such as FMECA, FRACAS, FTA, LORA, MTA, RCMA, and other related maintenance planning tasks, as well as RAM and LCC analyses. Throughout the maintenance planning process, however, it is important to remember that, "the PM will integrate the product support design into the overall design process, and assess enablers that improve supportability, such as diagnostics and prognostics, for inclusion in the system performance specification. As the design matures, the PM will ensure that life-cycle affordability is a factor in engineering and sustainment trades."[24]

Implementation of a disciplined design for support approach, including these SE analysis tools are directly linked to a system's RAM attributes and LCC, and will play a key role in not only establishing top-level product support metrics, but in ultimately meeting Warfighter performance requirements. Close collaboration between systems engineers and life-cycle logisticians is critically important during system design and development and throughout the life-cycle. These tasks are further refined during the subsequent BCA to determine a cost effective, sustainable product support solution to meet user needs in an operational environment.

4.2.4 Identify/Refine Performance Outcomes

Using your product support requirements, develop a process for identifying critical product support outcomes and how you will measure success. Identify the critical behaviors that your metrics will influence to achieve your product support strategy outcomes. The starting points for metrics identification are Warfighter outcomes and OSD's specified top-level weapon system metrics. Each product support strategy, as it evolves, must be tailored consistent with the maturity of data and existence of in-place support infrastructure and capabilities. The metrics defined as accountable outcomes must be tailored accordingly, with an objective to maintain a close correlation with, and enable the achievement of, the Warfighter and OSD top-level outcomes.

Having collected the Warfighter, Service, and OSD requirements for each IPS Element, the PSM must decide on the actual and as-measured performance outcomes required for the product support strategy.

A Product Support Arrangement (PSA) (e.g., CDD, CPD, or MOA) between the PSM and the Warfighter states the objectives that form the basis of the product support effort. The PSM should focus on a few key outcomes, such as weapon system availability, mission reliability, logistics footprint, or overall system readiness levels, using the metrics as discussed in this guidebook's **Section 0**, "Metrics." Linking key reliability, availability, maintainability, and supportability metrics to existing Warfighter measures of performance and reporting systems is essential. Many existing logistics and financial metrics can be directly related to top-level Warfighter performance outcomes.

PBL is a critical tool in affordably delivering Warfighter support. It fundamentally changed the way we structured product support. It directly ties the delivery and support of products and services to Warfighter product support outcomes to enable Warfighter effectiveness. In an era of shrinking budgets and increasing costs, support solutions must balance Warfighter outcomes with the cost of delivery. PBL strategies/arrangements are included in Better Buying Power initiatives because of their ability to balance cost and performance, regardless of industry or the Government providing the service. PBL also provides explicit productivity incentives and ensures the best value for the DoD.

4.2.5 Business Case Analysis (BCA)

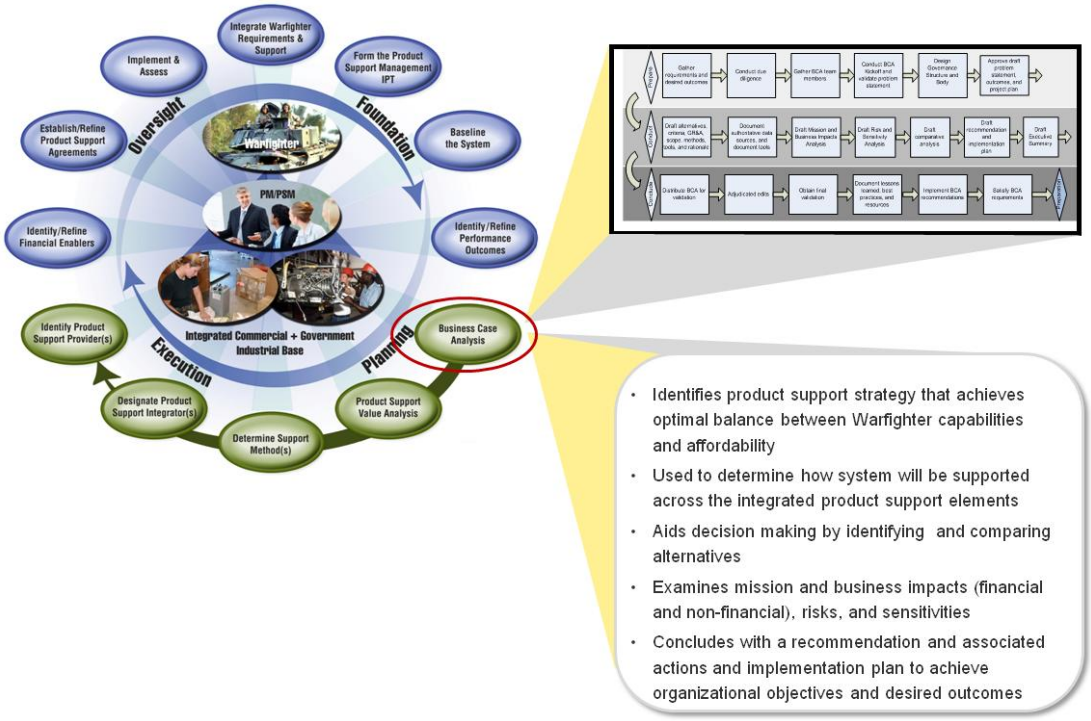
Assess the capabilities, effectiveness, cost, competencies, and process efficiencies to identify the optimum best value product support solution.

[24] DoDI 5000.02 *Operation of the Defense Acquisition System,* Enclosure 2

4.2.5.1 BCA Purpose

Figure 9 shows where the BCA occurs, at the beginning of the planning cycle. BCA is a structured methodology and document that aids decision making by identifying and comparing alternatives by examining the mission and business impacts (both financial and non-financial), risks, and sensitivities. The BCA concludes with a recommendation and associated specific actions and implementation plan to achieve stated organizational objectives and desired outcomes. The goal of a Product Support or Sustainment BCA is to identify the product support strategy that achieves the optimal balance between Warfighter capabilities and affordability. A BCA does not replace the judgment of a decision maker, but rather provides an analytic, standardized, and objective foundation upon which credible decisions can be made. The BCA should be a full, fair, and accurate comparison when evaluating multiple alternatives. A BCA is used for major life-cycle, sustainment, and other product support decisions, especially those that result in new or changed resource requirements. The BCA helps leadership with significant investment and strategic decisions. For example, use a Product Support BCA to evaluate a decision on whether or not to transform business operations such as the degree of commercial involvement and choosing a PSI/PSP, develop a Web-based curriculum, or retire an asset.

Figure 9. Product Support BCA.


Integrate Warfighter Requirements & Support
Form the Product Support Management IPT
Baseline the System
Identify/Refine Performance Outcomes
Business Case Analysis
Product Support Value Analysis
Determine Support Method(s)
Designate Product Support Integrator(s)
Identify Product Support Provider(s)
Identify/Refine Financial Enablers
Establish/Refine Product Support Agreements
Implement & Assess
Oversight
Foundation
Planning
Execution
Warfighter
PM/PSM
Integrated Commercial + Government Industrial Base
Identifies product support strategy that achieves optimal balance between Warfighter capabilities and affordability
Used to determine how system will be supported across the integrated product support elements
Aids decision making by identifying and comparing alternatives
Examines mission and business impacts (financial and non-financial), risks, and sensitivities
Concludes with a recommendation and associated actions and implementation plan to achieve organizational objectives and desired outcomes

A product support BCA provides a best value analysis, considering not only cost, but other quantifiable and non-quantifiable factors supporting the product support strategy implementation and related investment decisions.

4.2.5.2 BCA Structure

Although BCA contents and implementation processes will be promulgated in a separate *DoD Product Support BCA Guidebook*, a product support BCA should include:

1. Executive Summary
2. Introduction
   a. Problem Statement

   b. Background
   c. Scope
3. Desired Outcomes & Requirements
   a. Desired Outcomes
   b. Requirements
4. Methods & Assumptions
   a. Ground Rules & Assumptions
   b. Analysis Methods, Tools & Rationale
   c. Evaluation Criteria
5. Alternatives
   a. Current Baseline/Anticipated Initial Support/Status Quo
   b. Alternatives
6. Mission & Business Impacts
   a. Benefits & Non-Financial Analysis
   b. Cost & Financial Analysis
7. Risk Analysis & Mitigation Plans
   a. Risk Analysis
   b. Mitigation Plans
8. Sensitivity Analysis
9. Conclusion
   a. Comparison of Alternatives
   b. Summary of Results
10. Recommendations
   a. Specific Actions Based on Business Objectives
   b. Implementation Plan

The BCA becomes an iterative process, conducted and updated as needed throughout the life-cycle as program plans evolve and react to changes in the business and mission environment. The BCA is not intended to incorporate in all cases the same methodology or level of analysis. Any analysis should be tailored to the nature of the specific product support decision. The PSM should identify the appropriate analytical methodology for the circumstances while addressing the costs, benefits, risks, and sensitivities to changes in the available support alternatives.

4.2.5.3 Product Support Strategy Value Analysis

Best value analysis to optimize long-term LCC and benefits would include:

- Optimum level of support (system, sub-system, or component level), evaluation of product support strategy considerations related to the 12 IPS Elements
- SCM strategy
- Workload allocation strategy (including Depot maintenance, Core, 50/50, $3M Rule, and PPP considerations)
- Refinement of program Data Management Strategy (DMS)
- Strategies for continuous modernization and improvement of system RAM, and proactively addressing obsolescence, Diminishing Manufacturing Sources and Material Shortages (DMSMS), and corrosion issues.
- LCC control and risk mitigation
- Affordable alignment with Department strategic objectives

A product support BCA provides a best value analysis, considering not only cost, but other quantifiable and non-quantifiable factors supporting the product support strategy implementation and related investment decisions. This can include, but is not limited to, performance, producibility, reliability, maintainability, and supportability enhancements. In outcome based product support strategies, it is important and frequently necessary to make up-front investments in Reliability and Maintainability (R&M) improvements and proactive obsolescence/DMSMS

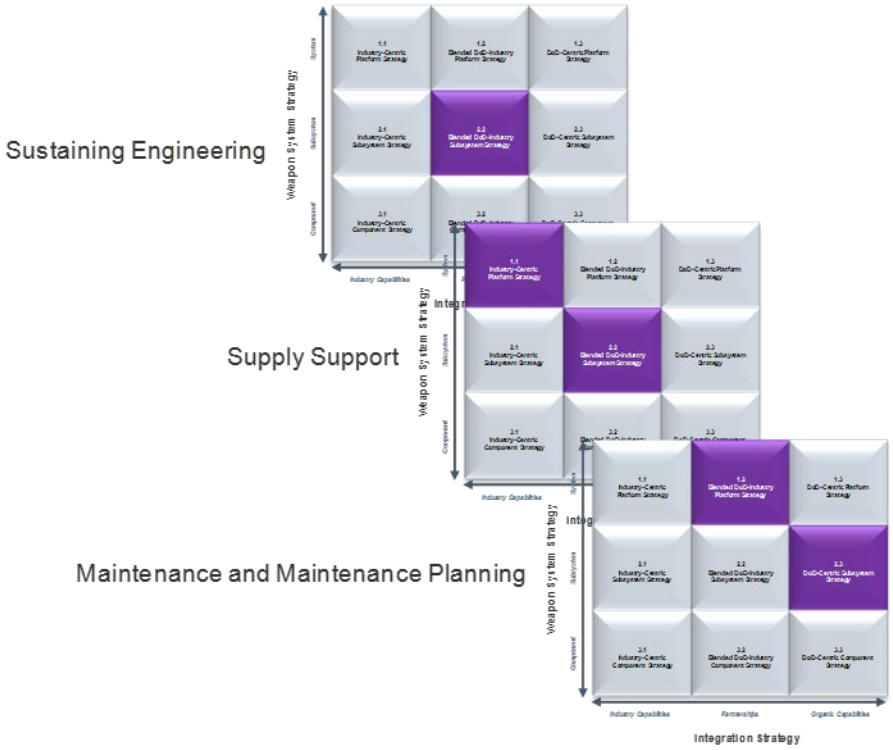
mitigation that result in short-term increases in system costs to generate the requisite LCC savings later. To effectively provide this justification, it is critical that the process, scope, and objectives of the BCA be clearly understood and communicated. A BCA should be developed in an unbiased manner, without prejudice, and not constructed to justify a preordained decision. The analysis must stand on its own and be able to withstand rigorous analysis and review by independent audit agencies. A Product Support Strategy BCA is an iterative process, periodically revisited, or updated throughout the life-cycle. Strategic decisions informed by BCAs also include:

- The initial decision to invest in a project
- The decision to select among alternative approaches
- The validation of any proposed project scope, schedule, or budget changes
- The identification of various budget accounts and amounts affected by the various product support strategies
- The verification that planned benefits are realized at the completion of the project

The Product Support BCA should be a living document (i.e., as project or organization changes occur, these should be reflected in updates to the business case). This information should be used in further decisions to sustain or enhance the solution and to refine estimation of benefits and costs for future projects in the organization. The independently and objectively derived BCA will identify which alternative provides optimum mission performance given cost and other constraints, including qualitative or subjective factors.

The outcome of the BCA will support an integrated support strategy which will fall somewhere on the PSDM shown in Figure 2. Note that this matrix shows the continuum between component and system-centric strategies and Government and commercial capability-based strategies. As mentioned earlier, virtually every product support strategy is comprised of both Government and commercial product support. Finding the right blend of both public and private support while simultaneously determining the level (component, subsystem, system) of support, and tailoring that support to the objective system dependent on its life-cycle phase, mission, operational environment, and funding requirements is a complex process. While the PSDM shows nine discrete support strategy “blocks,” in reality there are variations within each of those blocks, resulting in a continuum of product support alternatives. This means the PSM should look at selected strategies from the perspective of what is required for their system with regard to determining the appropriate mix of support sources required to achieve Warfighter requirements at a best value.

Figure 10. Sample BCA Recommendations on Best Value Alternatives.



Each IPS Element will have a recommendation to achieve Warfighter requirements at a best value, with this recommended alternative falling somewhere on the PSDM.

Figure 10 shows how an airplane BCA might recommend the best value alternative for the Sustaining Engineering, Supply Support, and Maintenance and Maintenance Planning IPS Elements. Similar PSDMs would show the best value strategy for each of the remaining IPS Elements. In this example, Sustaining Engineering would be performed on a subsystem basis with a dedicated team of Government and commercial engineers. Supply Support would similarly have a partnership to support engines with Government and commercial personnel. Conversely, the Supply Support strategy for the plane that is independent of the engine is to use capabilities that are predominately held by a commercial entity with only minimal Government involvement to manage the airframe PSI. Finally, Maintenance and Maintenance Planning would have a partnership with roughly equal Government and commercial capabilities providing Depot-level maintenance services at the system level with organizational-level maintenance performed by organic personnel.

4.2.5.4 Determine Support Method

Determine whether support will be acquired from the PSIs or PSPs using an outcome- or transactional based acquisition method. Decision(s) are validated or made using a best value analysis consistent with the BCA.

A PSM does not perform product support. Rather, he or she is the architect of that support, conducting a considered analysis leading to a decision as to where, how, and by whom that support will be accomplished. Once they have selected the providers of product support, they must decide how that support is to be acquired. There are ultimately only two options available to them (with some variations between these two options). They can either acquire the discrete goods and services necessary to enable the required Warfighter outcomes, or they can acquire the outcomes themselves. The former is the "transactional" support model, and the latter is the "performance-based" (or outcome based) model. DoD policy and guidance specifies a preference for the performance-based model wherever possible. In using the transactional

model, the PSM and the organic support corpus must determine the quantities, timing, and locations where the unit-purchased goods and services must be delivered or accomplished – a demanding and complex task. If the support purchased proves to be inadequate (or too much) the risk for performance, cost, and obsolescence, along with storage, maintenance, and distribution lies entirely with the organic acquirer of support. In the performance- or outcome based model, there is a shared risk equation. The PSM, in assigning responsibility for outcomes to a PSI (who accomplishes them through management of subordinate PSPs), is responsible for specifying and incentivizing the appropriate outcomes. If those have been specified correctly, the responsibility for delivering them is shared between the PSM and the PSI. The method of support, transactional or performance-based does not alter the basic functions or tasks that comprise the support, only in how that support is acquired. The PSM retains the overall role of and accountability for managing product support on behalf of the Warfighter.

4.2.5.5 Designate PSI(s)

For outcome based support, identify the PSI(s) who will be delegated the responsibility to integrate support providers to deliver the specified outcomes assigned consistent with the scope of their delegated responsibility. Decision(s) are validated or made using a best value analysis consistent with the BCA.

A fundamental tenet of the PSBM is identifying single-point accountability for support. That responsibility belongs to the PSM, who delegates, as supported by the BCA, responsibility for one or more components of support to one or more PSIs who are responsible for integrating their sources of support, public and private, to meet the identified performance outcomes. The PM or PSM, selects a PSI from the Government or private sector to coordinate the work and business relationships necessary to satisfy the PSA.

The PM's responsibilities for oversight and management of the product support function are typically delegated to the PSM, who leads the development and implementation of the product support strategies and ensures achievement of desired support outcomes during sustainment. The PM/PSM and the Product Support Management IPT employ a PSI, or a number of PSIs as appropriate, to achieve those outcomes. The PSI is an entity performing as a formally bound agent (e.g., Performance-Based Agreement (PBA) , contract, Memorandum of Agreement (MOA) , Memorandum of Understanding (MOU) Service Level Agreement (SLA), etc.) charged with integrating all sources of support, public and private, defined within the scope of the PSAs to achieve the documented outcomes. The PSM, while remaining accountable for system performance, effectively delegates the responsibility for delivering Warfighter outcomes to the PSI. In this relationship, and consistent with outcome based product support, the PSI has considerable flexibility and latitude in how the necessary support is provided, so long as the outcomes are accomplished.

Given the stated preference (by policy and statute) for outcome or performance-based acquisition of product support services, an effective product support strategy will generally include designation of one or more PSIs who will be responsible, within the scope of their assigned product support outcomes, for managing and integrating the functions and PSPs necessary to achieve the specified performance and/or support outcomes designated by the PSM. Note that there are circumstances when transactional support is a correct support solution and may be evaluated as an alternative. In all cases, the PSM is accountable to the PM for the support outcome.

The role of the PSI can be narrow or broad, as directed and designed by the PSM. At one end of the spectrum, a single PSI could be assigned with the responsibility for entire system level outcomes (e.g., operational availability, A_M). This approach has the advantages of clearly assigning responsibility (and visibility) of Warfighter outcomes to a single-point of responsibility and provides for a comprehensive and horizontally integrated support solution that accounts for all the product support elements. Alternately, the PSM can assign top-level PSI roles for the major system subsystems; the most prevalent example would be dual PSIs for an aircraft system, with a PSI designed for the airframe and a PSI designated for the propulsion system. Devolving

further, PSIs could be assigned for multiple major subsystems that comprise a larger platform system capability, such as a naval vessel. The determination of the number, designation, and responsibilities of the PSIs comprising a product support strategy framework will result from both the BCA process as well as the PSM's consideration of the operational mission role, environment, and support requirements of the objective system.

The PM or PSM selects a PSI from DoD or the private sector. Activities coordinated by support integrators can include, as appropriate, functions provided by organic organizations, private sector providers, or partnership(s) between organic and private sector providers. The PSM ensures that the product support concept is integrated across the IPSEs to provide an agile, robust, and cost-effective combat capability. The PM /PSM invites the Service and DLA logistics activities to participate in product support strategy development and IPTs. These participants help to ensure effective integration of system oriented approaches with commodity oriented approaches (common support approaches), optimize support to users, and maximize total logistics system value.

As with the product support strategy and the arrangement with the Warfighter, the PSI function is a key component of the product support strategy documented in the Acquisition Strategy and the LCSP. While product support execution is accomplished by numerous organizational entities (i.e., PSPs), the PSI is the single point of accountability for integrating all sources of support necessary to meet the agreed to support/performance metrics. The most likely candidates for the integrator role are:

- The system's OEM or prime contractor/vendor
- An organic agency, product, or logistics command (e.g., DLA, NAVICP, Depots)
- A third-party logistics integrator from the private sector
- The PM's own logistics organization

Once the PM has answered some key questions, he or she is better able to evaluate the PSI options and select the alternative that provides the greatest benefits.

- What sustainment functions are planned to be included in this product strategy?
- What specific capabilities are required to perform these functions?
- Are these functions inherently Governmental?
- Are there statutory or regulatory limitations associated with performance of these functions?
- Are the desired functions more commonly performed in the commercial sector?
- Which provider offers the optimal mix of required performance at the lowest LCC (also frequently referred to as best value)?

Anyone who provides products or services in the sustainment of an acquisition system is a PSP. The primary role of the PSI is to integrate the activities of the various PSPs. The PSI function can be aligned along vertical (weapon system platform) or horizontal (at the sub-system, commodity, or component level) axes. The primary difference in the two approaches is whether or not the PSI is assigned the responsibility of implementing and managing the support functions from the top down (a weapon system platform approach), or incrementally across a range of subsystems that may support multiple platforms.

4.2.5.6 Identify PSP(s)

Utilizing BCA value analysis as well as PSI discretionary decisions for lower tied supplier support, select the best mix and blend of sources to perform the product support functions. Decision(s) are validated or made using a best value analysis consistent with the BCA.

A primary objective of the BCA process is to determine, for the individual IPS Elements and, in aggregate, the objective system, the optimum sources of support depending on capabilities, competencies, best value, and the qualitative efficiency and effectiveness of support. For each of

the IPS Elements, there will be logical candidates, both public and private, to accomplish the required product support. And within each of the IPS Element support functions the work will further delineate into technical, hands-on, management, and quality tasks. DoD guidance expresses a clear preference for performance-based support, unless there is compelling financial, statutory, or other factors compelling pursuit of a transactional approach. The PSM may elect to assign support integration responsibilities to one or more PSIs who will be assigned specified performance or support outcomes and, consistent with that assignment, given authority to manage the PSPs and functions necessary to achieve those outcomes. The "mix" of PSIs and PSPs may be Government or commercial, as determined by the BCA process. The use of a performance-based support strategy can simplify the complex process of configuring the broad range of sustainment functions and support providers so as to optimize achievement of required Warfighter capabilities. The most likely candidates for the PSP roles include:

- The system's OEM or prime contractor/vendor
- Commercial-sector suppliers, vendors, sub-contractors, support contractors, etc.
- An organic agency, product, logistics or materiel command, DLA, NAVICP, Depots, USTRANSCOM
- Commercial sector logistics, Maintenance, Repair, and Overhaul (MRO), and transportation organizations
- The PM's own logistics organization

4.2.6 Identify/Refine Financial Enablers

Identify the range, types, and amount of funding needed to perform the required support consistent with the terms, conditions, and objectives of the PSAs.

Once the product support strategy "framework" has been finalized to show the range and responsibilities of the PSIs and PSPs and the enabling PSAs have been drafted, the PSM should work the financial aspect of assuring that appropriate levels and types of funding are resourced to successfully execute the strategy. The amounts and types of funding required will be driven by the unique needs and characteristics of the system and its operational priorities. As discussed in **Section 0**, product support can be accomplished by various funding appropriations throughout the life-cycle, including Procurement, RDT&E, and O&S.

The PSM should plan and advocate for sufficient funding from the organizations to which those funds have been appropriated. This can involve actions ranging from ensuring that an adequate budget projection, commonly referred to as a "wedge," is inserted into the Planning, Programming, Budget, and Execution (PPBE) process sufficient to effect transition of a development system to operational use with sufficient funds for support, including Procurement and RDT&E funds for known required modifications and upgrades necessary for effective sustainment of the system. Once the funds have been appropriated, the PSM should ensure the funds are made available as needed to fund the support as defined in the PSAs. While the Warfighter advocates for the required funding, the PSM has a clear management and oversight role of the funds used for product support. The PSM should request the full amount of funding needed and provide impact statements to the Warfighter, PM, and program sponsor explaining the impact of the reduced support that resulting from incomplete funding.

4.2.7 Establish/Refine Product Support Arrangements

Document the implementing PSAs (contract, MOA, MOU, PBA, CSA, SOO/SOW for the Performance Work Statement, etc.) that assign and delineate the roles, responsibilities, resourcing, and reciprocal aspects of product support business relationships.

PSAs, discussed in detail in **Section 0** and **Appendix E – Product Support Arrangement (PSA) Types** serve to formalize the roles, responsibilities, relationships, and commitments of the active participants in the product support strategy, including, at minimum, the PM, PSM, Warfighter customer, resourcing Commands, PSIs, PSPs, and associated stakeholders or participants in product support. PSAs may take a variety of forms, including MOUs, MOAs, PSAs, and contracts, or a combination of any or all of these. The PSM should ensure that PSAs

are in place to document and define each relationship that is part of the execution of the product support strategy. These PSAs should exactly reflect the price and performance agreements used in source selection and include agreed on mechanisms to demonstrate achievement of outcomes. The PSAs should ensure the PSM's plan will be executed in a manner agreeable to both the PSI and the PSM.

4.2.8 Implement & Assess

Implement and manage the product support, including documenting updates to the LCSP, conducting and implementing recommendations from LA, and maturing the product support solution). Include the continuous, ongoing assessment of Product Support effectiveness through using the established governance mechanisms driving decisions to review, modify, revise, or evolve product support strategies and business arrangements.

The PSM's oversight role includes developing the performance assessment plan, monitoring performance, and revising the LCSP and Product Support Package as needed. The PM also acts as the agent for the Warfighter, certifying PSI performance and approving incentive allocations. The PSM should take a hands-on approach and not assume that the PSAs will be self-regulating.

Programs are required to conduct periodic post-IOC assessments of system support strategies to determine actual versus expected levels of performance and support.[25] These reviews occur nominally every five years after IOC, after changes in requirements/design or by performance problems. These reviews should at a minimum assess:

- PSI performance
- Product improvements incorporated
- Configuration control
- Modification of PSAs as needed based on changing Warfighter requirements or system design changes
- Revalidation or re-accomplishment of the product support strategy BCA(s)[26]
- Affordability and cost control of current product support strategy

The PSM should review each PSI's performance against its PSA on at least a quarterly basis and use that data to prepare for the post-IOC assessments.

5.0 Sustainment in the Life-Cycle Phases

5.1 Introduction

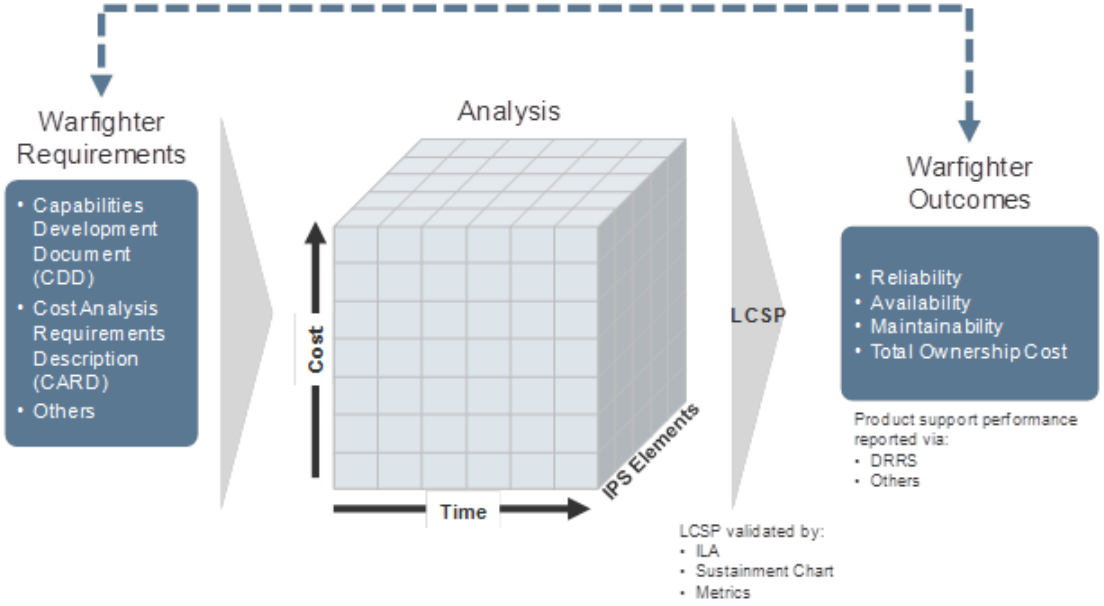
This section is oriented around the major phases of a program's life-cycle and the activities and deliverables associated with each phase and start with the Warfighter and sustainment stakeholders developing sustainment requirements. The PSM then develops a strategy and plans to fulfill these requirements. These strategies and plans address each of the IPS Elements and will change over time. This change over time is represented by the SMLs, which describe the expected level of maturity and summarize key documents and capabilities of the sustainment program at a given point in the weapon system life-cycle. Execution of these plans and strategies result in associated costs that also vary across the life-cycle. Finally, execution of these plans

[25] PL 111-84, *The National Defense Authorization Act for Fiscal Year 2010*, Section 805 – Requirements for Lifecycle Management and Product Support

[26] Revalidating the BCA does not mean that the BCA must be completely redone every five years. If the BCA ground rules and assumptions and operating environment have not changed, no errors in the original BCA are uncovered, and the product support solution is performing well, no other action is required. However, if the conditions under which the support solution was implemented have changed or before a new product support solution is implemented, the GR&A should be updated and a new BCA performed.

and strategies also result in Warfighter-desired support outcomes. This process is shown in **Figure 11**.

Figure 11. Life-Cycle Product Support Process.



A successful outcome-based product support strategy uses structured analysis to convert Warfighter requirements into product support outcomes.

The sections that follow address each of the life-cycle sections shown in the integrated view above. Specifically, this guidebook addresses: MSA, Technology Maturation and Risk Reduction, Engineering and Manufacturing, Production and Deployment, and O&S phases. These sections have the following elements:

- The program life-cycle phase overview with key events, SML considerations, and recurring major objectives
- Key information requirements for the life-cycle phase (see DoDI 5000.02, Table 2 for complete list.)
- PSM Guidance on specific activities within the life-cycle phase

Specific Product Support activities linked to the ILA are included in **Appendix F – Using the ILA Assessment Criteria**, as a product support management tool.

5.2 Materiel Solution Analysis (MSA) Phase

5.2.1 Overview

The purpose of this phase is to conduct the analysis and other activities needed to choose the concept for the product that will be acquired, to begin translating validated capability gaps into system-specific requirements including the KPPs and KSAs, and to conduct planning to support a decision on the Acquisition Strategy for the product. AoA solutions, key trades between cost and performance, affordability analysis, risk analysis, and planning for risk mitigation are key activities in this phase. Unless this phase of the Acquisition process is being applied to a legacy system that is receiving a major modification, there will be little actual data and most estimations will be derived from analogous systems or engineering projections. Accordingly, the primary objective of this phase is ensuring user requirements and operational environmental constraints impacting sustainment are identified and documented in the LCSP

The PSM team will execute the activities required in the MSA phase to support the maturing support solution characterized by the SMLs which are aligned with program key events in **Table 1**.

Table 1. Milestone A Activities and Documents.

Life-Cycle Phase	Program Inception	MSA	Milestone A
SMLs		**SMLs 1-4**	
Key Events, Entry/Exit Products/Documents	ICD	AoA	ICD, LCSP, BCA, SEP, DMS
IPS Elements			
Product Support Management		X	
Design Interface		X	
Sustaining Engineering			
Supply Support		X	
Maintenance Planning & Management		X	
PHST		X	
Technical Data		X	
Support Equipment		X	
Training & Training Support		X	
Manpower & Personnel		X	
Facilities & Infrastructure		X	
Information Technology (IT) Systems Continuous Support		X	

5.2.2 SMLs in the Materiel Solution Analysis (MSA) Phase

SMLs 1-4 identify Warfighter requirements and operational concepts that should be identified to ensure that they are understood and agreed on by all stakeholders. Note that this would normally be the responsibility of the PSM but there may be a different entity performing this since the PSM might not yet be designated. The logistics and sustainment capabilities and potential maintenance concepts should be evaluated as part of the AoA. Boundary conditions for this phase should include the following:

- **Operational CONOPs.** Conduct a "day in the life" use-case scenario to understand how the system might be supported in an operational environment.
- **IPS Elements.** Assess each IPS Element and establish the initial baseline for each IPS Element's implementation.

SML 1–3 activities will use these boundary conditions while SML 4 activity focuses on how the program developmental efforts acknowledges and defines logistics and sustainment KPP/KSAs as considerations in the program integrated system requirements definition. **Table 2** lists key entry/exit events/documents.

5.2.3 Key Information

Table 2. MSA Phase Key Information.[27]

Entry
Initial Capabilities Document
AoA Plan
Alternative Maintenance & Sustainment Concept of Operations
Exit
AoA (including market research results)
Capability Development Document
Consideration of Technology Issues (part of the Acquisition Strategy)
T&E Strategy
Acquisition Strategy
SEP
Replaced System Sustainment Plan
LCSP
Intellectual Property Strategy
IUID Plan (part of SEP)
BCA
Should-Cost Target
Core Logistics Determination

5.2.4 Major Activities

5.2.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

The greatest flexibility in defining a product support strategy exists during this phase. The fundamental goal is aligning broad product support strategy requirements with the Warfighter's requirements. Also, no new system specific investments have been made in supporting the weapon system. Accordingly, PSM s have the least constraints during this phase and should

[27] As defined in DoDI 5000.02

actively search within and outside of their Service for existing solutions for each IPS Element and understand the extent to which potentially shared solutions achieve performance and cost outcomes that are highly similar to their Warfighter customer's requirements. The beginning of a program's life-cycle is the best time to promote standardized systems, components, spare parts and support equipment. PSM s should specifically look to their logistics directorates, their Secretariats, Office of the Assistant Secretary of Defense Logistics & Materiel Readiness, DLA, and industry associations to efficiently gain the broadest possible perspective on potential enterprise synergies.

Once potential high-performing outcome based strategies are identified, the PSM should analyze feasibility of migrating those solutions to their program and determine whether clarification and negotiation of changing requirements with the Warfighter are warranted.

IPS Elements are still relatively unconstrained during this phase since their primary function is in helping define potential product support alternatives. Two broad areas are directly influenced by IPS Element trades and relationships in this phase.

1. **Logistics Footprint.** Logistics footprint minimization in projecting and sustaining the force is an overarching DoD goal because minimizing the logistical burden a system will place on deployed forces benefits the user, improves deployment time, and can help reduce the LCC. During this phase, footprint metrics appropriate to the system and its operational environment should be analyzed and considered as subsequent KPP, KSA, or design requirements. At a minimum, logistics footprint metrics to meet the concept of operations should be established to be used in baseline trade analyses throughout the life-cycle to help impact the design and establish a minimal logistics footprint for the system concept.
2. **System Design.** Address the system's design and planned logistics resources support its readiness requirements and wartime utilization. This includes consideration of activities and resources (such as fuel) necessary for system operation as well as real world constraints and environment. It also includes all resources that contribute to the overall support cost (e.g., personnel; equipment; technical support data; and maintenance procedures to facilitate the detection, isolation, and timely repair/replacement of system anomalies).

5.2.4.2 Business & Variance Analysis

Data in this phase may be minimal and uncertainty will be high. Regardless, the PSM must bound this uncertainty as much as possible by creating at least a high-level BCA that will be updated as better data is obtained. The primary objective of analysis during this phase is to ensure complete LCC will be captured and used to create fair comparisons between alternatives as potential sustainment strategies are developed. This means that key sustainment related cost performance criteria, such as site activation non-recurring costs and O&S cost per operating hour should be considered in implementing the Cost as an Independent Variable (CAIV) principle. Additionally, the PSM must ensure modeling and simulation is used in support of a robust AoA during the Technology Maturation and Risk Reduction Phase selection process and to define the desired ranges for the sustainment metrics thresholds and objectives.

5.2.4.3 Supply Chain Management (SCM)

Supply chains in this phase are notional at best since supply support and maintenance concepts are not yet known. However, part of understanding potential enterprise synergies involves understanding potential supply chain synergies. For example, if the system will be an advanced attack helicopter, the cost and performance of a benchmark population of aviation systems should be examined to understand the results of potential supply chain models. To that end, using SCOR® to understand the plan, source, make and maintain, deliver, and return aspects of alternative supply chains examined while looking for enterprise synergies will provide a ready way to quantitatively and qualitatively compare potential solutions and ensure all aspects of the supply chain are considered. A thorough review of currently fielded systems, components, spare parts,

and support equipment should be conducted to encourage the highest degree of standardization and prevent unneeded development of new supply chains.

5.2.4.4 LCSP & Product Support Package Initiation

The LCSP starts in this phase as the sustainment concept. Create the LCSP in accordance with the DAG at this stage; the LCSP will capture initial support and maintenance concepts based on AOA results and requirements identified in initial CDD. Also, create a plan to collect additional information to refine the LCSP and fill in all placeholders. There are no Product Support Package updates at this point of the life-cycle.

5.2.4.5 Funding Alignment

Funding during this phase is focused on ensuring any new sustainment technologies needed to achieve the requirements identified in the AoA are funded appropriately.

5.3 Technology Maturation & Risk Reduction Phase

5.3.1 Overview

The purpose of this phase is to reduce technology, engineering, integration, and LCC risk to the point that a decision to contract for EMD can be made with confidence in successful program execution for development, production, and sustainment. The PSM's major objective in the Technology Maturation and Risk Reduction phase is ensuring the supportability design features achieve supportability KPP/KSAs and are incorporated in the overall design specifications. Essential IPS Element activities are developing the supply chain performance requirements, logistics risks and risk mitigation strategies, the maintenance concept and sustainment operational plan from the MSA documents, training strategies, support equipment plans, technical data management and infrastructure, and manpower and personnel strategies.

The PSM team will execute the activities required to support the Technology Maturation and Risk Reduction phase of the support solution characterized by the SMLs which are aligned with program key events as seen in **Table 3**.

Table 3. Milestone B Activities and Documents.

Life-Cycle Phase	Technology Development	Milestone B
SMLs	**SMLs 5-6**	
Key Events, Entry/Exit Products/Documents	PDR, ILA	APB, CDD, AS, LCSP, TEMP, DMS, SEP, ICE
IPS Elements		
Product Support Management	X	
Design Interface	X	MAC
Sustaining Engineering	X	
Supply Support	X	
Maintenance Planning & Management	X	CLA

PHST	X	Transportability Report
Technical Data	X	
Support Equipment	X	
Training & Training Support	X	STRAP
Manpower & Personnel	X	
Facilities & Infrastructure	X	
Information Technology (IT) Systems Continuous Support	X	

5.3.2 SMLs in the Technology Maturation & Risk Reduction Phase

SMLs 5-6 propose that the initial system capabilities have been analyzed, initial supportability objectives and requirements have been defined and initial RAM management strategies have been formulated and integrated with the SE process. Design features needed to achieve the product support strategy, including diagnostics and prognostics, should be incorporated into system performance specifications. The TEMP addresses when and how sustainment design features and sustainment metrics will be verified. The LCSP should be written and approved, to include supply chain performance requirements, manpower, information technology infrastructure, Corrosion Prevention and Control (CPC) planning, support equipment plans, logistics risks and mitigation plans, preliminary support strategies, and preliminary PSA strategies.

PSMs measure success in this phase by the quality, as measured by the ILA process, with which the following boundary conditions develop and influence the design of both the system and its Product Support Package:

- **Operational CONOPs**. Expand the “day in the life” use-case scenarios developed previously to include sparing levels, fleet sizes, operator and maintainer training, operating locations, manpower, information technology infrastructure, support equipment plans, and operating tempos.
- **Approach to Design Influence to Achieve Support Strategy**. The maintenance and logistics support planning must be closely coordinated with the design iteration process to accurately reflect the needs of the design and its current configuration and conversely, to influence design formulation consistent with the optimum product support strategies determined from an operational effectiveness and LCC viewpoint.
- **Life-Cycle Phase Boundary Conditions for Product Support Elements.** Assess each IPS Element and establish the baseline for each IPS Element’s implementation and use this to develop and establish the initial BCA framework and schedule.
- **PSM Organizational Construct and Integration into the Program Management Team**. Collaborate with PM and ensure the PMO contains a cross-IPS Element and cross-organizational team to help manage product support with a focus on the requirements that were decided on in Milestone A and then integrating those requirements in SE process. **Table 4** lists key entry/exit events/documents.

5.3.3 Key Information

Table 4. Technology Development Phase Key Information.[28]

Entry
Draft Capability Development Document (including sustainment technology issues)
Acquisition Strategy
Affordability Analysis
T&E Strategy
Initial Support & Maintenance Concepts
Support Strategy
DMS
Item Unique Identification (IUID) Plan
Exit
AoA (including market research results)
System Performance Specification
Capability Development Document
Preliminary Design Review results
TEMP
Programmatic Environmental, Safety & Occupational Health Evaluation (PESHE)
Intellectual Property Strategy
Acquisition Strategy
SEP
Human Systems Integration (HSI)
Cooperative opportunities
Core Logistics Analysis/Source of Repair Analysis
MDA-approved Source of Repair decision
Industrial capabilities
LCSP
LCC Estimate & Manpower Estimate
Preliminary Maintenance Plans

[28] For complete list of required information/documentation, see DoDI 5000.02, Enclosure 1, Table 2.

Acquisition Program Baseline (APB)
Affordability Assessment (including DoD Component Cost Analysis & ICE)
Economic Analysis
Replaced System Sustainment Plan (RSSP)
PESHE compliance schedule
Should-Cost Target

5.3.4 Major Activities

5.3.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

Data in this phase is more mature since laboratory generated data is more available and support concepts are more refined which allows for using better analogous data. This data should be used to help crystallize enterprise synergy opportunities that will be captured during the build-out of the product support organization.

The PSM should use the more mature data available in this phase to begin a robust logistics portion of the TEMP. This plan should rely on a Model Based Enterprise for sustainment planning to design the complete life-cycle sustainment concept and all interrelating IPS Elements. This will allow rapid systematic analysis of tradeoffs and understanding of relationships between those IPS Elements via modeling and simulation.

The PSM should ensure that data collected and information generated use a standards-based Product Life-Cycle Support data exchange to ensure that life-cycle data can be used throughout the program by all system development and sustainment partners. The PSM should also ensure that all data and information is captured in a Government accessible IDE. Additionally, the Intellectual Property/Data Management Strategy should include the technical data requirements for initial provisioning and cataloging. Further, depending on the product support strategy, and in order to enable competition and mitigate DMSMS and obsolescence, the requirement for technical data necessary for re-manufacturing, re-procurement, and/or sustainment engineering should be addressed.

During this phase, the PSM should also create an initial baseline “map” of the desired product support organization that provides the concept of operations of how sustainment will be executed. This map should be based on initial analyses and will create a convenient way for the PSM to understand the interrelationships of all entities that form the product support organization.

5.3.4.2 Business & Variance Analysis

The PSM should use analysis to refine conceptual support strategies developed previously into an integrated preliminary product support strategy. The BCA process should be used to accomplish this with a focus on understanding the likelihood of alternatives achieving the Warfighter required outcomes resulting from the requirements development process. Part of the outcome of the BCA process should be a list of potential risks and mitigation plans associated with the LCSP support strategy.

5.3.4.3 Supply Chain Management (SCM)

Supply chain performance requirements to meet the required system performance and cost metrics should be determined through analysis done in support of the TEMP. SCM enabling technologies such as usage of Service and Agency managed ERP software or the requirements for stand-alone software should be determined. Additionally, decisions on basing requirements and site activation should be made and documented in the LCSP.

5.3.4.4 LCSP & Product Support Package Update

The LCSP is a living document and will be updated as sustainment strategies evolve. The initial LCSP, however, should be finalized and approved during this phase. The Product Support Package development plan should be structured at this time to construct the PSAs needed to execute the LCSP.

5.3.4.5 Funding Alignment

Funding during this phase is, as with Milestone A, focused on ensuring investment account funding is provided to develop the system and that innovations that will reduce the LCC during sustainment are planned for and funded appropriately.

5.4 Engineering & Manufacturing Development (EMD) Phase

5.4.1 Overview

The PSM's objective in the Engineering and Manufacturing Development (EMD) phase is ensuring the program develops an integrated logistics system that meets readiness targets, sustains system performance capability threshold criteria, manages O&S cost, optimizes the logistics footprint, and complies with environmental and other regulations.

The PSM team will execute the activities required to produce the solution characterized by the SMLs which are aligned with program key events as defined in **Table 5**.

Table 5. Milestone C Activities and Information

Life-Cycle Phase	Engineering & Manufacturing Development	Milestone C
SMLs	**SMLs 7-8**	
Key Events, Entry/Exit Products	CDR, T&E, Log Demo, ILA	APB, CDA, CPD, AS, DSOR, LCSP TEMP, IUID Plan, CPCP, DMS, TC, MR, Depot Maint Support Plan, Disposal Plan, PBAs, BCA, SEP, Non-Organic Support Transition Plan
IPS Elements		
Product Support Management	X	
Design Interface	X	
Sustaining Engineering	X	
Supply Support	X	Provisioning Data

Maintenance Planning & Management	X	CDA MAC
PHST	X	Transportability Report
Technical Data	X	Equipment Pubs
Support Equipment	X	
Training & Training Support	X	STRAP
Manpower & Personnel	X	BOIP
Facilities & Infrastructure	X	
Information Technology (IT) Systems Continuous Support	X	CR Management Plan

5.4.2 SMLs in the EMD Phase

SMLs 7-8 indicate that the Product Support Package element requirements are integrated, finalized, and reflect the approved system design and Product Support Strategy. Testing validates that the design conforms to support requirements and that the boundary conditions are operationally suitable. In addition, sustainment metrics are estimated based on the latest configuration and test results. The approved Product Support Package's capabilities, including associated supply chain and other logistics processes and products, are demonstrated and validated to ensure the support solution is operationally suitable and affordable. **Table 6** lists key entry/exit events/documents.

5.4.3 Key Information

Table 6. EMD Phase Key Information[29]

Entry
AoA (including market research results)
System Performance Specification
Capability Development Document
Preliminary Design Review results
TEMP
PESHE
Information Support Plan
Acquisition Strategy

[29] For complete list of required information/documentation, see DoDI 5000.02, Enclosure 1, Table 2.

HSI
Cooperative opportunities
Core Logistics Analysis/Source Of Repair Analysis
Industrial capabilities
LCSP
LCC Estimate & Manpower Estimate
Preliminary Maintenance Plans
APB
Affordability Assessment (including DoD Component Cost Analysis & ICE)
Exit
APB
Acquisition Strategy
Affordability Analysis
Capability Production Document
Clinger-Cohen Act compliance
Contract type determination
Cooperative opportunities
Core Logistics Determination/Sustaining Workload Estimates
General Equipment Valuation
Independent Cost Estimate
Independent Logistics Estimate
TEMP
PESHE Compliance Schedule
LCSP
Manpower Estimate
Intellectual Property Strategy
Corrosion Prevention & Control Plan
CPD input
SEP update

Technology Readiness Assessment
Full Funding Certification Memorandum
Should-Cost Target

5.4.4 Major Activities

5.4.4.1 Enterprise Synergies, IPS Element Trades, and Key Relationships

The product support organization is solidifying during this phase. Initially there is some flexibility, but through analysis and negotiating of PSAs, that flexibility is replaced by a tangible product support organization. Synergies that should be captured during this phase will be identified through analysis. These synergies are located primarily within the supply chain and include opportunities such as using preexisting contracts with commercial industry partners to gain economies of scale in the procurement of goods and services, expanding capabilities within those Centers of Industrial and Technical Excellence (CITEs), and maximizing the use of common DoD distribution processes via the Distribution Process Owner (DPO).

During this phase, supportability design features are incorporated into the maturing design via trades along with other design considerations such as weight, size, and bandwidth. Also, the product support organization should be matured to support IOC. Accordingly, IPS Element trades are made as part of ongoing negotiations between Warfighters and sustainers to finalize PSA requirements for PSIs and PSPs. The PSM should update the baseline product support organization "map" that addresses each IPS Element with the entities, required service levels, PSAs, information channels, and any other pertinent information.

5.4.4.2 Business & Variance Analysis

Data is more mature during this phase than in previous phases since the system prototypes will be in operation. This means that there will be much less reliance on analogous data and more on engineering analysis. Since there is less uncertainty, the BCA produced is used to actually develop the PSAs and make the investment decisions that will be major components of the Product Support Package.

Product support models that are used for inventory planning, manpower planning, training planning, and all other IPS Elements should be updated with actual data as it becomes available. Variance between actual data and estimations created during previous analyses should be examined to validate or influence the selection of new product support decision tools.

5.4.4.3 Supply Chain Management (SCM)

The supply chain design is finalized based on the product support strategy. Every aspect of the supply chain should drive to achieve the Warfighter required performance and cost metrics and should have in place mechanisms to automatically and electronically share data and information between all Services, Agencies, and commercial entities that help manage and comprise the supply chain. The Supply Chain evaluation will focus on ensuring operational supportability and verifying performance. It should include a comprehensive description of the elements, and fielding plan.

Based on the outputs of the BCA and in alignment with the approved product support strategy, initial provisioning decisions should consider innovative approaches such as Direct Vendor Delivery (DVD), prime vendor, consignment, or leased repairables strategies in addition to Government owned inventory. When PBL arrangements use commercial sources, the PSM should work with the ICP/DLA on smartly drawing down existing Government inventory and adjusting inventory levels and forecasting to meet changes in demand. Data collection channels to capture FMECA information to improve material reliability should be validated. This will help the PSM reduce learning curve and make reliability improvements earlier in the system's life.

5.4.4.4 LCSP Product Support Package Update

The LCSP continues to mature in this phase. Resource requirements are driven by the specific Service approach to deploying and operating the system. Resource requirements for the production and deployment phase are determined and agreed on via collaboration between the program management team and external stakeholders. One item of particular importance at this time is selecting the Depot repair location(s). Within 90 days of Critical Design Review (CDR), the Depot Source of Repair (DSOR) recommendations should be finalized and forwarded to the appropriate Service official for approval. The DSOR determination process should consider all existing Depot-level maintenance capabilities and assign work to an existing CITE with the core competency if available. New competencies should be assigned to and developed at a single source of repair to the maximum extent possible. Further, DSOR assignments for workloads not needed to sustain core logistics capabilities should rely on a best value analysis and satisfy all applicable statutory requirements. Once approved, the DSOR assignments should be documented in the LCSP and all remaining actions to finalize Depot-level maintenance planning completed. At Milestone C, the LCSP will focus on ensuring operational supportability and verifying performance. It will include a comprehensive description of the product support package elements and fielding plan

The LCSP should be updated with the final "map" of the product support organization. The product support strategies determined through the BCA process and approved by the ultimate decision makers should be recorded in the LCSP. Also, the Product Support Package that implements the LCSP should be adjusted to contain the formal PSAs that document the PSIs and PSPs.

5.4.4.5 Funding Alignment

Resource requirements are driven by the projected fielded design, likely Product Support Package performance-based on test results, and the specific Service approach to deploying and operating the system. Resource requirements for the production and deployment phase are determined and agreed on via collaboration between the program management team and external stakeholders. The Product Support Package fielding resources requirements must be in place entering into the Milestone C decision.

5.5 Production & Deployment (P&D) Phase

5.5.1 Overview

The PSM's primary objectives in the P&D phase are to execute the LCSP well and to constantly monitor that execution to rapidly adjust the LCSP as operational realities dictate. The PSM team will execute the activities of the support solution characterized by the SMLs which are aligned with program key events as detailed in **Table 7**.

Table 7. Initial Operating Capability Activities and Documents

Life-Cycle Phase	Production & Deployment	IOC
SMLs	**SMLs 9-10**	
Key Events, Entry/Exit Products/Documents	LRIP, TPF, PPP, FRP, OT&E, ILA	Mission Support Plan, PSP,BCA, MR Approval, Materiel Fielding Plan Disposal Plan
IPS Elements		
Product Support Management	X	BCA, Post-IOC Rev
Design Interface	X	

Sustaining Engineering	X	
Supply Support	X	DMSMS Plan
Maintenance Planning & Management	X	
PHST	X	
Technical Data	X	Equipment Pubs
Support Equipment	X	
Training & Training Support	X	Training Program of Instruction
Manpower & Personnel	X	Trained Personnel
Facilities & Infrastructure	X	Depot Maintenance Capability
Information Technology (IT) Systems Continuous Support	X	PD SW Support

5.5.2 SMLs in the P&D Phase

SMLs 9-10 indicate that the Product Support Package is fielded to support initial operating capability. The Product Support Package is fielded at operational sites and sustainment and product support capabilities proven in an operational environment. Performance is measured against availability, reliability and cost metrics. Any identified issues or "weak spots" identified through testing have remediation plans that are being executed. Finally, the product support organization is measured against its ability to meet planned A_M, Materiel Reliability, Ownership Cost and other sustainment metrics required to support the Warfighter.

In this phase, resource requirements for logistics infrastructure as outlined in the established boundary conditions are funded and implemented by the Services. Critical activities the PSM must execute that will drive results are:

5.5.2.1 Service Capital Investment Follow-up.

Complete essential activities such as Site Activation Gap Closure, sparing strategy execution, DMSMS management strategy execution, Training Concurrency Options, Information Architecture Maturation Plan, and Maintenance, Repair, and Overhaul (MRO) solution development.

5.5.2.2 Supplier Reliability Performance.

Monitor and manage effectiveness of the product support organization at accomplishing required outcomes. **Table 8** lists key entry/exit events/documents.

5.5.3 Key Documents

Table 8. Initial Operating Capability Key Documents[30]

Entry
Initial Product Baseline

[30] As defined in the *DAG*

Test reports
PESHE
Acquisition Strategy
HSI
TEMP
Information Support Plan (ISP)
LCSP
Updated Maintenance Plan
Updated Affordability Assessment
CPD input
Cost/Manpower Estimate update
Exit
LCSP/Supportability Assessment Strategy/Post Production Support Plan
BCA
PSAs (e.g., ICS, CLS, organic, performance-based)
Post Production Software Support Plan/Contract
Acquisition Strategy & Data Management Strategy
Materiel Release Approval & Materiel Fielding Plan
DMSMS Plan
Depot Maintenance Support Plan
Configuration Management Plan
Replaced System Sustainment Plan (RSSP)

5.5.4 Major Activities

5.5.4.1 Enterprise Synergies, IPS Element Trades & Key Relationships

PSM s should focus on monitoring product support developments within their own and others' parent organizations to capture emerging best practices or high performing shared services for their own use. This is important because the LCSP is relatively mature in this phase and support strategies are only going to be modified when there is a compelling reason to do so.

IPS Element trades and relationships are relatively unchanged from the previous phase, but the PSM's understanding of those relationships may evolve as data is collected. Observed changes should be reflected in the product support organization map.

5.5.4.2 Business & Variance Analysis

Analysis in this phase focuses on monitoring and identifying the root cause of variance between planned and actual cost and performance. Ongoing analysis of each IPS Element's achievement of required performance objectives, including variance between predicted and actual results, may indicate that IPS Element implementation strategies should be modified to some extent. Any modifications must be analyzed prior to implementation to maximize their likelihood of success.

The PSM should use a program management dashboard or other similar toolset that employs such tools as statistical process control charts or instantaneous performance meters to provide ongoing indication of program health. Moreover, the PSM should look specifically for leading indicators that will help the PSM identify and mitigate potential product support issues before they happen.

5.5.4.3 Supply Chain Management (SCM)

Supply chain performance should be closely monitored during this phase since this is the first real "stress test" the supply chain has faced. Any improvement opportunities identified will be easier to address before the behaviors and practices that created those improvement opportunities are part of the product support organization's culture.

This phase will also see a strong reliance on using the production supply chain to support sustainment. The PSM should ensure that measures are in place that ensure the easy access to parts that are earmarked for production do not encourage complacency with supply chain managers, who may see that access as a ready source of spares, otherwise, the supply chain will have a tendency to default to a spares-centric strategy. Furthermore, relying on a production supply chain risks putting undue stress on the production organization and may have cost implications.

Finally, if the product support strategy requires contractors in a battlefield environment, ensure the execution of this strategy is in accordance with Joint Publication 4-0 *Joint Logistics*, Chapter 5 and DoD Component implementing guidance. The PSM should coordinate supply chain services to ensure affected Combatant Commanders are aware of functions performed by contractors, together with functions performed by military personnel, and Government civilians, are integrated in Operations Plans (OPLANs) and Orders (OPORDs).

5.5.4.4 LCSP & Product Support Package Update

During this Phase, the Product Support Package implementing the approved LCSP is in place. The PSM will use continuous data collection to validate that performance and cost accrual is according to plan. If the business analysis indicates a change in the LCSP is required, the PSM must update the LCSP and Product Support Package, as needed.

5.5.4.4 Funding Alignment

During this phase, some sustainment may be paid for with procurement dollars, but the PSM must remain vigilant to ensure O&M dollars are being programmed to ensure product support plans are executable. The PSM should work with the PM and Program Executive Office (PEO) to align Service or Joint funding to support the system.

5.6 O&S Phase

5.6.1 Overview

The O&S phase of the defense system framework represents the longest duration period of the weapon system life-cycle and constitutes the largest portion of weapon system LCC (approximately 60–70 percent). As the single largest component of the DoD budget, the impact of the O&S phase on LCC is enormous.

O&S begins when an operational capability has been fielded. This generally occurs at the IOC milestone, but depending on fielding strategies, may occur earlier. Sustainment of the weapon system begins prior to IOC as early production assets are delivered for T&E, LRIP, and/or other pre-operational uses. This "pre-operational" support is usually performed primarily by the OEM

under an Interim Contractor Support (ICS) arrangement due to lack of an organic infrastructure (Depot support capability must be in place no later than four years following IOC for systems determined to be "core" IAW Title 10 U.S.C. § 2464, Paragraph (a) (3)). Active analysis, planning, and continuous refinement of the long term product support strategy that is guided by the PSM should be underway.

At IOC, one of the primary objectives of the product support strategy is to ensure the Program can achieve the sustainment KPP and KSAs. As used in operations, the PSM assesses the effectiveness of the sustainment approach in terms of these measures as a basis for evaluating and revising the product support strategy. Changes may be required due to changes in operational requirements (operational tempo, operational environment, mission changes), sustainment challenges (infrastructure and/or capabilities), funding constraints, or political shifts. Each change requires an evaluation of the product support strategy via the BCA process.

PSM s must revalidate their program's support strategy and ensure that it still strikes an optimal balance between suitability and affordability. Legislation requires revalidated BCA whenever a new support strategy is proposed, or every five years, whichever comes first.[31] PSM s must continually monitor and assess their programs to understand their sustainment strategies' suitability and determine when strategy updates are required, particularly in light of how operating conditions and baseline assumptions change over the system life-cycle. Although the PSM will not be the decision authority making the final disposition decision, he or she must also recognize when the system has reached the end of its planned useful life to determine life extension or disposal plans. The PSM will, however, play a key role in providing input to the status of the system during O&S.

PSM tasks in the O&S phase differ from those during design or development. During design and development, the PSM is planning for sustainment. During O&S, the PSM is executing sustainment while continuously monitoring the performance of the system and assessing the effectiveness and affordability of the product support strategy. With the system in operational use, actual data is available as a basis for analysis and product support decision making. Operational issues, system reliability, demand rates, response-times, funding requirements, and PSP performance are visible and must be addressed as needed. Incremental development of systems may precipitate the requirement to support multiple configurations or blocks of a weapon system.

As the system ages and evolves, the PSM role also evolves. Out-of-production systems have an entrenched sustainment infrastructure in place and are typically suffering from declining performance and rising sustainment costs due to diminishing reliability as parts and components wear out or are impacted by obsolescence and DMSMS. It is difficult for the PSM to do a considered assessment and revision of the product support strategy in the face of significant day-to-day challenges to maintain operational readiness. The path of least resistance is often stop gap measures addressing evolving critical items, finding needed spares, and juggling shifting priorities, with little time available to analyze and revise the product support strategy. Yet unless the PSM takes a proactive action to accomplish this critical action, the "death spiral" of declining performance and rising O&S cost will only worsen. These many challenges must be successfully navigated by the PSM during the O&S phase to properly support the Warfighter. The PSM team will execute the activities of the support solution characterized by the SMLs which are aligned with program key events as detailed in **Table 9**.

Table 9. O&S Activities and Documents.

Life-Cycle Phase	Operations & Support	FOC

[31] PL 111-84, *The National Defense Authorization Act for Fiscal Year 2010*, Section 805

SMLs	SMLs 11-12	
Key Events, Entry/Exit Products/Documents	Post-IOC Review, ILA, CDA	Mission Support Plan, PPSP, BCA, MR Approval, Materiel Fielding Plan Disposal Plan
IPS Elements		
Product Support Management	X	BCA, Post-IOC Rev
Design Interface	X	
Sustaining Engineering	X	
Supply Support	X	DMSMS Plan
Maintenance Planning & Management	X	
PHST	X	
Technical Data	X	Equipment Pubs
Support Equipment	X	
Training & Training Support	X	Training Program of Instruction
Manpower & Personnel	X	Trained Personnel
Facilities & Infrastructure	X	Depot Maintenance Capability
Information Technology (IT) Systems Continuous Support	X	PD SW Support

5.6.2 SMLs in the O&S Phase

SMLs 11-12 indicate that sustainment and product support performance is being regularly measured against sustainment metrics and that corrective action has been taken. The Product Support Package has been refined and adjusted based on performance and evolving operational needs and initiatives to implement affordable system operational effectiveness have been implemented. All support systems and services have been delivered and Depot maintenance is being performed in accordance with the LCSP.

Moreover, analysis has revealed opportunities for product improvement, modifications, and upgrades and these changes have been planned. The product support strategy has been refined to achieve Warfighter-required outcomes by leveraging the best value mix of organic and commercial support for each of the IPS Elements. Finally, system retirement and disposal planning has been implemented as required.

If the program uses the tenets of this guidebook throughout the acquisition process, challenges in the O&S phase should be minimized due to the advanced planning inherent in the LCSP management process. Although still applicable, PSM s may be limited in their ability to apply all the tenets of this guidebook to a program that has already been fielded. The PSM can still work with the existing support solution to ensure product support success and evolve it over time to optimize performance. **Table 10** lists key entry/exit events/documents.

5.6.3 Key Documents

Table 10. O&S Key Documents [32]

Entry
LCSP/Supportability Assessment Strategy/Post Production Support Plan
BCA
PSAs (e.g., ICS, CLS, organic, performance-based)
Post Production Software Support Plan/Contract
Acquisition Strategy & Data Management Strategy
Materiel Release Approval & Materiel Fielding Plan
DMSMS Plan
Depot Maintenance Support Plan
Configuration Management Plan
Exit
Disposal Implementation Plan
Replaced System Sustainment Plan (RSSP)

If an entrance document does not exist, the information contained within it must be accounted for by formally identifying the documents that contain the entrance document identification.

5.6.4 Major Activities

5.6.4.1 Enterprise Synergies, IPS Element Trades, & Key Relationships

PSM s should focus on monitoring product support developments within their own and others' parent organizations to capture emerging best practices or high-performing shared services for their own use. The LCSP is mature in this phase and support strategies are only going to be modified when there is a compelling reason such as large cost-savings opportunities that are obtainable through change or difficulty in hitting required performance targets that would necessitate change.

One synergy that is predominately achieved during O&S is Technology Insertion (TI), which is a process for strategically improving system capability or reliability or mitigating DMSMS issues via modernization. The PSM must understand the opportunity and risk relative to TI. Affordability gains are tied to scalability of TI over time and ease of inserting new technology. TI initiatives are planned to reflect a strategy for long-term affordability, supportability, performance and availability. Success is more likely when TI is addressed at the architecture level. The use of standards, modular design and open systems approach enables TI in the future. Although TI planning is successful at the system level for sustaining a given capability, large gains are more likely when TI is addressed at the domain or program office level and then coordinated within the specific programs. The role of PSM should coordinate and align with higher-level TI strategic planning and with other members of the IPT including SE and finance in relation to the development and fielding of the support system.

[32] As defined in the *DAG*

5.6.4.2 Business & Variance Analysis

The Life-Cycle BCA initiated and completed prior to Milestone C is the tool the PM and PSM used to determine best support and best value sustainment solution for the weapon system. The Life-Cycle BCA began with the development and establishment of the Program's Technical Baseline. The Life-Cycle BCA's level of fidelity at this time will depend on the design maturity of the system as well as the maintenance plan's maturity.

Specific instructions on BCA completion process, product template, and authoritative data sources are contained in the *BCA Guidebook*. If the PSM's program is legacy and does not currently have a BCA, the PSM should complete a cost and performance baseline that addresses each portion of the standard DoD BCA to economically and effectively understand the program's current status and to enable future BCAs. This use of a the standard BCA process also ensures that the PSM will meet the requirements that stipulates a review of a weapon support strategy every five years or prior to a major change in the program.[33]

5.6.4.3 Supply Chain Management (SCM)

The supply chain is evolving in parallel with the system it supports. PSM s should work closely with their PSI s/supply support activities to monitor the health and efficiency of the supply chain. Any improvement opportunities identified will be easier to implement now than at any other time in the program's future since the behaviors and practices that create those improvement opportunities have not yet become part of the product support organization's culture.

Eventually, the system will no longer be in production and any product support strategy that relied on the production supply chain will need to be shifted to a pure sustainment supply chain. Also, the risk of DMSMS increases over this time and the PSM must constantly monitor this through annual assessments of the supplier base health. As performance base arrangements are implemented with industry, a balance must be reached between using increased competition to keep a downward pressure on prices and appropriate contract lengths that encourage investment in process and product improvement through innovation. The goal is to deliver reliable performance at reduced costs rather than competing simply to drive cost down without regard to increasing the variability in performance experienced by the Warfighter.

5.6.4.4 Configuration Management

The PSM must address Configuration Management (CM).[34] This CM should manage change by documenting and disseminating changes prior to or as they occur. This will ensure that supply chain managers understand the material they are responsible for and which material will no longer apply to their system.

The PSM should ensure a CM process that includes surveillance of the combined and systematic application of the following sub-processes.

- Configuration Identification
- Configuration Control
- Configuration Control Board (CCB)
- Configuration Audits
- Functional Configuration Audit (FCA)
- Physical Configuration Audit (PCA)
- Configuration Status Accounting

5.6.4.5 LCSP & Product Support Package Update

Prior to the O&S phase, the LCSP is predominately estimations and assumptions. Update the LCSP with new analysis as it is generated and empirical data as it is collected during the O&S phase as needed based on product support performance and evolving needs to ensure the plan

[33] Requirements for Lifecycle Management and Product Support

[34] EIA-649B *National Consensus Standard of CM,* and MIL-HDBK-61A

maintains or increases relevancy. Ensure these analyses and data are of sufficient detail and focus to ensure the acquisition, design, sustainment, and user communities integrated by the PSM maintain a common understanding of evolving sustainment requirements, approaches, and risks and to ensure the PSM has the data needed to make fact-based decisions.

5.6.4.6 Maintenance Plan Update

A key part of the LCSP are the maintenance plans, which includes such items as preventative maintenance plans and programmed Depot Maintenance Plans. These plans should be updated throughout the O&S phase as new data is collected and analyzed. Also, conduct quality reviews, approve and issue maintenance plan updates and maintenance planning data for the users for acquiring the IPS Element products needed to sustain the weapon system and associated equipment. Finally, review the Maintenance Plan and Maintenance Concept for in-service equipment when one or more of the following events occur:

- Significant changes occur in the operational scenario
- Hardware maintenance significant drivers change as monitored through proactive sustained maintenance planning
- Product support falls short of the design requirement adversely impacting readiness or costs
- Class-1 ECP changes in legacy systems or equipment
- Real-world experience gained from fielded system utilization

In the DoD, a maintenance plan is a “living document.” The PSM should monitor the execution of the maintenance plan and ensure that maintenance is performed at the correct level and within the identified specification and scope of repair.

5.6.4.7 Maintenance Management

Monitor fleet maintenance to ensure maintenance is being performed in accordance with the established maintenance concept and maintenance plan. PSMs should use existing maintenance and supply chain reporting systems to monitor fleet maintenance, emerging safety issues, implementation design changes, and weapon systems usage trends that may impact service life and maintenance practices.

In the O&S phase the PSM will rely on his Cognizant Engineering Activity (CEA) to provide support in monitoring trends in SCM, failure modes, reliability, material degradation and management of critical safety items. In some cases, SMEs may be deployed directly to the maintenance activities to provide updated training and instruction that will supplement the established maintenance publications and instructions.

5.6.4.8 Funding Alignment

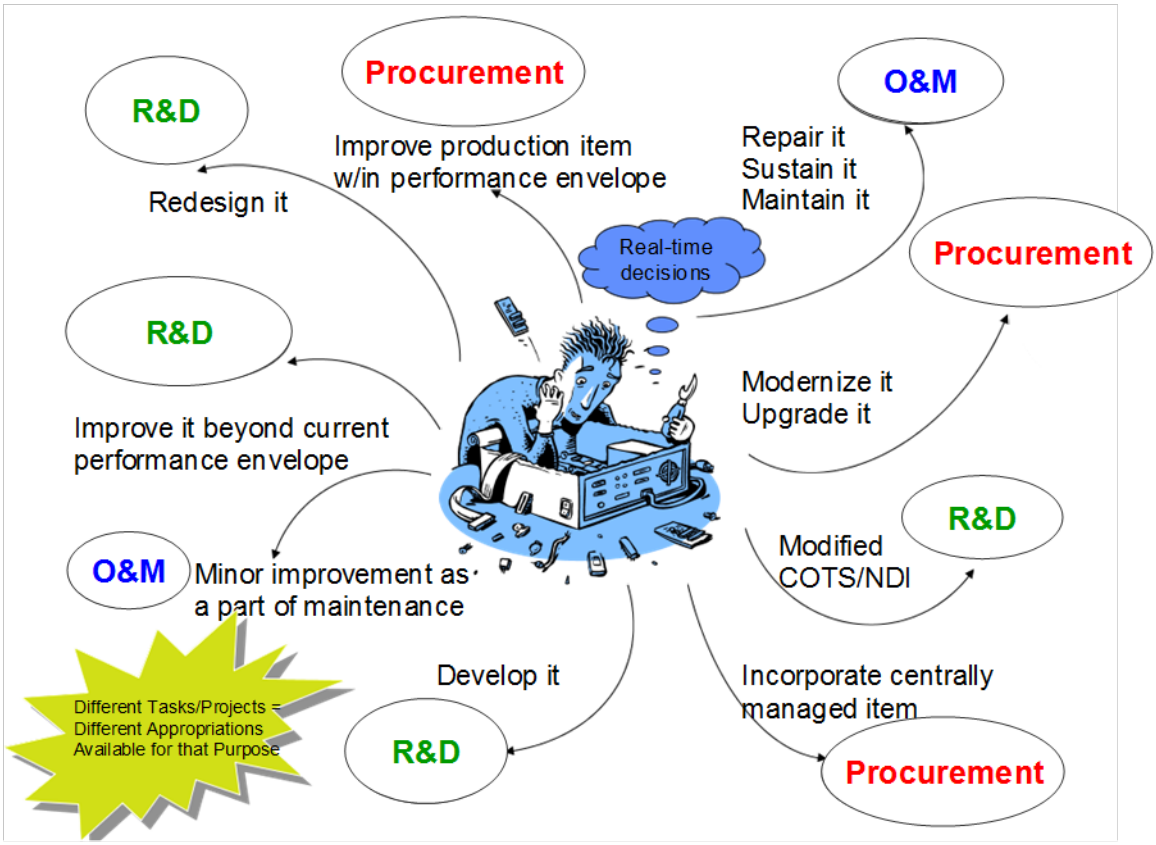
As a program transitions into O&S, emphasis shifts to supporting the fielded system by:

- Establishing and monitoring operational units
- Maintaining the readiness and operational capability of the deployed systems
- Continuing test and evaluation
- Identifying operational/support problems
- Determining if product improvement/service life extension programs are warranted
- Addressing equipment obsolescence/aging technology, structural fatigue, component/parts wear out, premature failures, changes in fuel/lubricants, and aging aircraft
- Sustainment efforts start immediately upon fielding and deployment of a system.

General IPS Element services obtained from in-house field activities or by contract that are integral to out-of-production and in-service systems and equipment should be properly funded. The PSM’s role regarding sustainment funding is to serve as an advocate for funding required to

implement and execute an effective and affordable product support strategy. This execution may be complex, as shown in **Figure 12**.

Figure 12. Complexity of Product Support Strategy Funding.



Product support strategy funding is governed by: Title 31 USC 1301 – Purpose Statute; 31 USC 1502 – Time Money is Available to Spend; 31 USC 1517 – Amount Available to Spend; and 31 USC 1341 – Color of Money.

Sustainment funding consists primarily of Operation and Maintenance (O&M) appropriations that are budgeted for and appropriated to the Military Departments. The PSM relies on the Major Operational Commands within the Military Departments to provide funding for the sustainment of the objective system or subsystem, using:

- O&M, to pay the Defense Working Capital Funds (DWCF) for Depot-level maintenance and repair, including the purchase of necessary supply parts to accomplish those repairs
- Procurement funds, to pay for the upgrade of weapon systems and subsystems

The DWCF provides a unique, dedicated, integrated, DoD-owned and operated worldwide supply, transportation, and maintenance system.

- Unlike other DoD organizations, the DWCF sells its products and services to its customers much like a private business and, with a few exceptions, it does not receive a direct appropriation.
- Unlike private-sector companies that provide similar services, the DWCF activities are chartered to support the DoD Warfighter using DoD civilians and military personnel. The

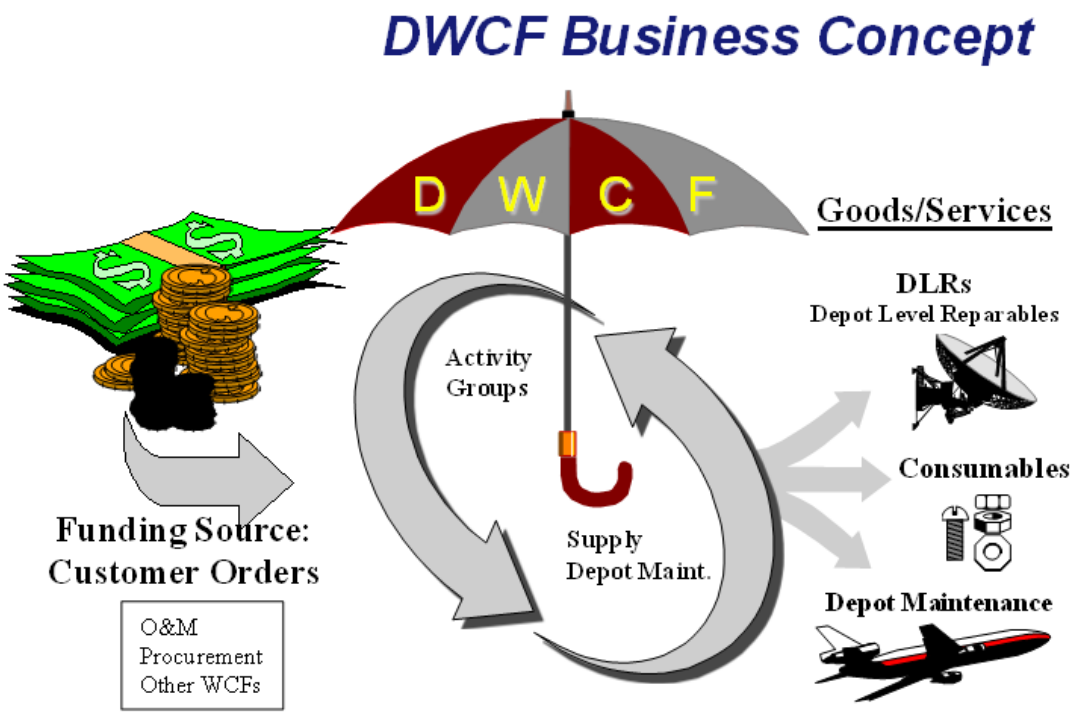
workforce is therefore stable, which is not always the case in a contract environment where contractors can change with each new competition.

What does the DWCF offer the PSM?

- Placing work with a DWCF activity is fairly straightforward, and, since the transaction is internal to DoD, Federal procurement rules do not apply.
- Since the DWCF is not operated for profit, it can retain capabilities that private sector companies may choose to divest. For example, it retains inventories of spare parts with low demand, an important consideration with aging weapon systems. It retains excess maintenance capacity during peacetime for use during extended contingencies.
- For new weapon systems, the PSM purchases and provides the DWCF with initial spares which the DWCF sells. The DWCF then uses the cash collected from the sale of parts and supplies to purchase replacement stocks.
- Because the DWCF has budgetary contract authority, it can order replacements prior to the receipt of funded orders, an important consideration for long-lead-time items.
- The prices the DWCF charges for parts or maintenance once set in the budget are not normally changed during the execution year. So, the PSM is protected from inflation; the price the PSM budgets for an item or labor hour is the price the PSM pays.
- The DWCF has extensive procurement expertise to seek the best price for spare parts from the industrial base and find new sources of supply when manufacturers decide to discontinue support.
- When necessary, the maintenance activities can fabricate the needed items.
- Several DWCF maintenance activities have special authorities that permit them to enter into partnership with private sector companies that permit the PSM to take advantage of the best of the public and private sectors. The private companies may operate in a DoD maintenance Depot dividing the work between the public and private workforces.

Figure 13 shows a simplified model of the DWCF business concept. Additional information on the financial aspects of the DWCF is available in the DoD Financial Management Regulation (FMR) 7000.14, Volumes 2B and 11B. In addition, the SMEs of the Revolving Funds Directorate in the Office of the Under Secretary of Defense (Comptroller) can provide policy and technical assistance.

Figure 13. DWCF Operating Model.



The DWCF provides a dedicated, integrated, DoD-owned and operated worldwide supply, transportation, and maintenance system.

5.6.5 O&S Phase Specific Major Activities

5.6.5.1 IPS Element Trades & Key Relationships

PSM s should continually review and assess the program's product support strategy. Changes to existing product support are usually driven by reliability, obsolescence, and maintenance support issues. Substantive changes to the operating environment or changes to the operational and mission requirements can also drive a review of the sustainment strategy. PSM s should work closely with their supply chain managers and DLA to identify those areas of support that require reassessment.

The PSM should document these decisions within the LCSP and should also document any requirements to deviate from the decisions recommended by the BCA s. The PSM should also maintain a complete history of BCA s over the course of the system life-cycle to be able to track decisions and understand how real-world operations are causing deviations from predicted cost and performance.

Robust sustainment governance is vital to fulfilling Warfighter A_M requirements and achieving the Department's program life-cycle management improvement objectives. The proper application of standardized, comprehensive and visible governance enables leadership focus on risk identification and continuous improvement, and enforces a culture of collaboration and accountability in meeting sustainment objectives. Implementing and managing sustainment governance must be a major focus for PSMs.

Formal requirements for sustainment governance, which are described below, have been established by the Department for acquisition programs. These requirements are considered minimum standards, and should be augmented by PSMs as necessary to ensure a forward

looking, action oriented approach to sustainment governance is applied. The governance approach must also ensure that responsibility for corrective action is assigned and corrective progress monitored.

5.6.5.2 Reset

"Reset" is a set of actions to restore equipment to desired level of combat capability commensurate with the unit's future mission. Equipment reset includes the repair, upgrade, and replacement of equipment damaged, worn out or destroyed in combat.

The overall objectives of reset programs are to restore units to a desired level of combat capability commensurate with the unit's future mission. It encompasses maintenance and supply activities that restore and enhance combat capability to unit and pre-positioned equipment that was destroyed, damaged, stressed, or worn out beyond economic repair due to combat operations by repairing, rebuilding, or procuring replacement equipment. These maintenance and supply activities involve Depot- and field-levels (e.g., Organizational and Intermediate) repairs/overhauls centrally managed to specified standards and extensive supply support provided by commercial and organic supply organizations such as DLA. Included are Procurement, RDT&E, and Operation and Maintenance funded major repairs/overhauls and recapitalization (Rebuild or Upgrade) that enhances existing equipment through the insertion of new technology or restores equipment to a zero miles/zero hours condition.[35] Roles and responsibilities include:

- Working with the Sustainment Engineering Team to develop maintenance requirements, based on the specific operational/environmental conditions and sustainment requirements; maintenance Tasks are derived from RCM analysis and organizational scheduled maintenance
- Addressing other considerations, including ensuring that publications are updated and reviewed, and that engineering investigation backlog and RCMA are completed
- Organizing reset teams to take the burden off the operational maintainer by using a contractor field team embedded within the maintenance processes and meets the service specific requirements for maintenance safety and operations

Best practices suggest reconstitution be performed on all weapon system returning from the operational theater that have at least 60 days of consecutive operations in theater. During the reconstitution phase, the PSM should assist organizational maintenance activities by supporting maintenance and supply requirements applicable to the weapon systems returning from theater and actively involved in a reset program.

5.6.5.3 In-Theater Sustainment

Best practices suggest In-theater sustainment be performed on all weapon systems that are deployed on extended rotation (more than 1 year) to ensure equipment is ready for tasking before return to their home base.

During the In-Theater Sustainment Phase, the PSM should assist organizational maintenance activities in supporting maintenance and supply requirements related to all weapon systems in the operational theater in an active reset program. Organizational maintenance activities and programs must collaborate with in-service engineering and logistics teams to maximize in theater sustainment capabilities.

Finally, the PSM should proactively identify and implement methods for reducing the logistics footprint required to sustain the system in-theater. Footprint reduction can be done via several mechanisms, of which three common mechanisms follow:

1. Identify logistics demand drivers, and then execute engineering change proposals to increase reliability to reduce that demand.

[35] Joint Publication 4-0 – *Joint Logistics,* Chapter 5

2. Leverage in-theater logistics networks to use existing infrastructure and personnel to support equipment rather than bringing additional material and personnel into theater.
3. Footprint reduction must account for fully burdened costs of fuel and personnel sustenance and support associated with the system's sustainment.

5.6.5.4 Technology Refresh & Insertion

During the O&S phase, the PSM must be actively engaged in any plans the program might have to implement TI, system upgrades, or implement windfalls or projects, engineering change proposals, value and logistics engineering change proposals. An evolutionary approach delivers capability in increments, recognizing up front the need for future capability improvements while recognizing the opportunities to improve reliability, maintainability, and availability.

5.6.6 System & Block Upgrades

With the onset of Service Life Extension Program (SLEP) system, block upgrades are becoming commonplace. Upgrades are sometimes pursued without due diligence. Some areas that continue to be overlooked that have a direct impact on supportability include:

- Technology maturity
- Commercial Off-the-Shelf (COTS)
- Design integration
- Configuration management and status accounting
- Supportability

It is important the PSM actively engage with the PM, Systems Engineer and the IPT to determine opportunities to leverage improvements within the scope of the modification. The modifications and upgrade process comes with a great responsibility for maintaining focus on improving the maintainability and suitability of the fielded system, while reducing LCC. While involved in a modification to the weapon system the PSM must:

- Ensure reliability growth opportunities are being considered and aggressively pursued
- Identify opportunities to improve support
- Identify and plan for associated risk
- Ensure all support requirements have traceability preventing requirements creep
- Continuously influence the deployed system design for support
- Identify and address supportability cost drivers such as obsolescence during the modification process using the BCA
- Consider other support strategies such as PBL to support the modification
- Ensure the allocation of funding for logistics, support planning and implementation
- Perform comprehensive analysis to evaluate proposed changes to each of the logistics elements in support of the upgrade

5.6.7 Technology Insertion (TI)

5.6.7.1 Tools & Methods

State-of-the-art methods and tools that may be useful in implementing and improving the effectiveness of planning for TI include:

5.6.7.2 Modeling & Simulation Tools

Such tools may be used to create executable architectures to verify that the proposed TI will in fact address the subject capabilities, and also to develop testing scenarios for the effort. Ensure these tools provide a focused, quantifiable result that adds value to the verification and validation processes.

5.6.7.3 Change Road Maps

Developing a roadmap would establish the strategic context for the insertion initiatives and identify the tactical efforts that are necessary to achieve the stated goals. Roadmaps provide a higher level of planning than a work-breakdown structure. The level of abstraction keeps the focus on the goals of TI and puts it in the appropriate time frame.

5.6.7.4 Value Networks

A value network is a graphic representation of all of the organizations, groups, and individuals that are or could be involved in the development, marketing, and use of a technology. Valuable information is derived in the course of building such a network that provides insight into innovative technology solutions and partnerships which might provide funding or in-kind resources along with improved speed and efficiency of implementation, and the influence of key players and opinion leaders.

5.6.7.5 Commercial off-the-Shelf (COTS)

The PSM should be actively involved in the AoA when COTS systems are considered for technology refresh or insertion. Although COTS may offer reduced schedule, greater technology maturity/stability and reduced cost initially, if it is deemed difficult to support it may not be a feasible selection. COTS can come with significant technical, schedule, and cost risks due to an underestimation of the following:

- Configuration management
- Maintenances planning
- Design integration complexity
- Rigidity applicable to intended operational environment
- Intellectual property access
- Design interface challenges (system of system compatibility)
- Obsolescence

6.0 Disposal (Reserved for future updates.)

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Appendix A – IPS Elements

Table 11: Major Elements of the IPS.

IPS Element	Activities
1. Product Support Management	1.1. Warfighter and Maintainer Requirements Capture 1.2. Alliance Management 1.2.1. PPP/Third Party Logistics (3PL) Management 1.2.2. International Partners 1.2.3. Foreign Military Sales (FMS) 1.3. Contract Development and Management 1.3.1. Develop and Maintain a PSA with the Warfighter 1.3.2. Develop and Maintain PSAs with the PSIs 1.4. Supportability Test and Evaluation 1.5. Development and Maintenance of Sustainment BCAs 1.6. Logistics Trade Studies 1.7. Product Support Performance Management 1.7.1. Manage Balanced Performance Metrics

IPS Element	Activities
	1.7.2. Sustainment Metrics Reporting 1.8. Product Support Budgeting and Funding 1.8.1. Budget Execution 1.8.2. Budget Management 1.8.3. Mid-Year Review Justification 1.9. TOC Management 1.10. Planning Management 1.10.1. IPT Management 1.10.2. ILA Management 1.10.3. LSCP Development and Management 1.10.4. Milestone Gate Review Management 1.11. Portfolio Transfer Planning and Transfer Execution 1.12. Logistics Policy Implementation 1.13. Configuration Management 1.13.1. Configuration Identification and Baseline Maintenance 1.13.2. Configuration Control 1.13.3. Configuration Status Accounting 1.13.4. Configuration Auditing 1.14. Performance-Based Life-Cycle Product Support (i.e., PBL) 1.15. Continuous Process Improvement (Lean Six Sigma, Theory of Constraints, etc.)
2. Design Interface	2.1. Standardization and Interoperability 2.2. Engineering Data Analysis 2.3. Net-Centric Capability Management 2.4. RAM Design 2.5. Producibility 2.6. Supportability/Sustainability 2.7. Deployability Management 2.8. HSI 2.8.1. Human Factors Engineering 2.8.2. Personnel 2.8.3. Habitability 2.8.4. Training 2.8.5. Safety and Occupational Health Plan Development and Management 2.9. Environmental Management 2.10. Warfighter/Machine/Software/Interface/Usability Management 2.11. Survivability and Vulnerability Management 2.12. Affordability 2.13. Modularity and Open Systems Architecture (MOSA) 2.14. Corrosion Control and Prevention 2.15. Non-destructive Inspection 2.16. Hazardous Material Management 2.17. Energy Management
3. Sustaining Engineering	3.1. Post deployment ongoing operational data analyses 3.2. Engineering considerations 3.2.1. Relation to Systems Engineering 3.2.2. Engineering and Technical Support 3.3. Analyses 3.3.1. Safety hazards 3.3.2. Failure causes and effects

IPS Element	Activities
	3.3.3. Reliability and maintainability trends 3.3.4. Operational usage profiles changes 3.4. Root cause analysis of in-service problems such as: 3.4.1. Operational hazards 3.4.2. Corrosion effects 3.4.3. Reliability degradation 3.4.4. Special Considerations for Software Sustainment Engineering 3.5. Development of required design changes to resolve operational issues 3.6. Materiel Improvement Plan (MIP) review boards 3.7. DMSMS mitigation 3.7.1. Parts obsolescence 3.7.2. Technology Refresh 3.7.3. Technology insertion 3.8. Engineering dispositions 3.9. Technical manual and technical order updates 3.10. Repair or upgrade vs. disposal or retirement 3.11. Maintenance evaluation automation 3.12. Failure Reporting, Analysis and Corrective Action System (FRACAS)
4. Supply Support	4.1. Initial provisioning 4.2. Routine replenishment management, including buffer and safety stock management 4.3. Demand forecasting and Readiness Based Sparing (RBS) 4.4. Bills of Material management and maintenance 4.5. Support equipment initial provisioning 4.6. Support equipment routine replenishment provisioning 4.7. Reparable, repair part, and consumable procurement 4.8. Cataloging 4.9. Receiving 4.10. Storage 4.11. Inventory management 4.12. Transfer 4.13. Issuance 4.14. Redistribution 4.15. Disposal 4.16. Material pricing 4.17. Total Asset Visibility/AIT 4.17.1. Serialized Item Management (SIM) 4.17.2. Item Unique Identification (IUID) 4.17.3. Radio Frequency Identification (RFID) 4.18. Shelf Life Management 4.19. Buffer Management 4.20. Warranty Management 4.21. Supply Chain Assurance 4.21.1. Counterfeit material prevention 4.21.2. Malicious hardware and software prevention 4.21.3. Unauthorized technology transfer prevention
5. Maintenance	5.1. Maintenance Concept Design 5.2. Core capability management

IPS Element	Activities
Planning & Management	5.3. Title X 50/50 management 5.4. Public-Private Partnerships 5.5. Maintenance execution 5.6. Level of repair analysis – hardware 5.7. Level of repair analysis – software 5.8. Failure Modes Effects and Criticality Analysis (FMECA) Required repair times determination 5.9. OPTEMPO variance management 5.10. Routine versus battle-damage repair management 5.11. Built-in and manual testability management 5.12. Inter-service, organic, and contractor mix of repair responsibilities 5.13. Condition Based Maintenance Plus (CBM+); Diagnostics, Prognostics & Health Management 5.14. Reliability Centered Maintenance (RCM) 5.15. Depot Workload Allocation, Planning, Activation, and Execution
6. Packaging, Handling, Storage & Transportation (PHS&T)	6.1. Short and long term preservation 6.2. Packaging requirements determination 6.3. Containerization requirements determination 6.4. Shelf life requirements determination 6.5. Handling requirements determination 6.6. Transportation requirements determination 6.7. Environmental control requirements determination 6.8. Physical shock control requirements determination 6.9. Static shock control requirements determination 6.10. Security classification requirements determination 6.11. Container Reutilization 6.12. Marking
7. Technical Data	7.1. Engineering data maintenance 7.2. Specifications determination 7.3. Standards management 7.4. Data Item Descriptions (DID) management 7.5. Technical standards development and management 7.6. Embedded Technical Data Systems 7.7. Technical manuals (TMs) including Interactive Electronic Technical Manuals (IETMs) management 7.7.1. S1000D Implementation 7.8. Engineering drawings management 7.9. Data rights management 7.10. Data delivery 7.11. Proprietary data management 7.12. Data validation 7.13. Data storage and backup
8. Support Equipment	8.1. Manual and automatic test equipment management 8.2. Equipment design 8.3. Equipment commonality management 8.4. Maintenance concept integration 8.5. Ground handling and maintenance equipment management 8.6. Equipment capacity determination 8.7. Air conditioners requirement determination and management 8.8. Generators requirement determination and management

IPS Element	Activities
	8.9. Tools requirement determination and management 8.10. Metrology and calibration equipment requirement determination and management 8.11. Deployability requirement determination management 8.12. Automatic Test Systems 8.13. Support Equipment Integrated Product Support
9. Training & Training Support	9.1. Initial, formal, informal, and On the Job Training (OJT) individual, crew, and unit New Equipment Training (NET) 9.2. Initial, formal, informal, and OJT individual, crew, and unit Institutional training 9.3. Initial, formal, informal, and OJT individual, crew, and unit Sustainment training 9.4. Initial, formal, informal, and OJT individual, crew, and unit Displaced Equipment Training (DET) 9.5. Embedded training insertion and management 9.6. Computer Based Training 9.7. Distance Learning 9.8. Training Equipment 9.9. Train the Trainer 9.10. Simulator Sustainment
10. Manpower & Personnel	10.1. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system operation 10.2. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system maintenance 10.3. Identification and acquisition of required numbers of active and reserve military officers and enlisted personnel as well as civilian personnel with the skills and grades required for system support 10.4. Wartime versus peacetime personnel requirements determination and management 10.5. Additional personnel identification and justification process management
11. Facilities & Infrastructure	11.1. Facilities Plan Management 11.1.1. Facilities and facility improvement studies design and execution for every IPS Element (i.e., Maintenance Planning and Management, Information Technology (IT) Systems Continuous Support, Training & Training Support, etc.) 11.1.2. Location selection 11.1.3. Space requirements determination 11.1.4. Environmental requirements determination 11.1.5. Security requirements determination 11.1.6. Utilities requirements determination 11.1.7. Storage requirements determination 11.1.8. Equipment requirements determination 11.1.9. Existing versus new facilities determination 11.2. Site activation
12. Information Technology	12.1. Life Cycle Sustainment Planning and Management

IPS Element	Activities
(IT) Systems Continuous Support	12.1.1 Pathway specific requirements (e.g., KPPs, KSAs, or for the Software Acquisition Pathway, the Capability Needs Statement) 12.1.2. Identify pathway specific IT requirements 12.1.3. Life Cycle Sustainment Plan (LCSP) inputs and reporting requirements 12.1.4. COTS/NDI/GOTs factors 12.1.6. Hardware/software operation and support 12.1.7. Disaster recovery planning and execution 12.1.8. Working group standup and management 12.1.9. Product Support Management considerations within agile software development 12.1.10. Product Support Management considerations within Development Security Operations (DevSecOps) 12.1.11. Software configuration management 12.1.12. Software continuous engineering capabilities (Software Transition Plan (STP) to include disposal) 12.1.13. Software product support integration planning 12.1.14. Software reuse including use of COTS and open source software 12.1.15. Software life cycle cost estimation 12.1.16. Software licenses management 12.1.17. Software deployment planning 12.1.18. Information Support Plan (PSM coordinates with the Systems and Software Engineers to ensure the ISP is tied back to the Service overarching communications ISP in order to reduce duplication, ensure backwards capability and interoperability). 12.1.19. Obsolescence and Diminishing Manufacturing Sources and Material Shortages (DMSMS) 12.1.20. Technology refreshment (or for the Software Acquisition Pathway this is now minimum viable product and minimum viable capability release). 12.1.21. Government-Industry Data Exchange Program (GIDEP) 12.1.22. Cloud computing sustainment considerations 12.1.23. Post Production Software Sustainment considerations (or post minimum viable capability release for the Software Acquisition Pathway) 12.1.24. Automated Identification Technology (AIT) management 12.1.25. Logistics Information Systems 12.1.26. Item Unique Identification (IUID) 12.1.27. IT Asset Management for hardware and tactical software tracking and accountability 12.1.28. Electronic Data Interchange (EDI) management 12.1.29. Interface management 12.1.30. Modular Open System Architectures 12.1.31. Deficiency reporting and tracking 12.1.32 Joint Deficiency reporting and tracking 12.1.33. Software and software intensive support equipment 12.2. Program Protection Planning (PPP)

IPS Element	Activities
	12.2.1. Cybersecurity 12.2.1.1. Cybersecurity Supply Chain Risk Management (SCRM) 12.2.1.2. Cybersecurity Maturity Model Certification (CMMC) 12.2.2. Standards for Software development, validation and verification 12.2.3. Anti-Tamper 12.2.3.1. Data Protection 12.2.3.2. Software Assurance. 12.3. Testing, assessment, and certification 12.3.1. Capability Maturity Model Integration 12.3.2. DT&E and OT&E Test Planning 12.3.3. ATO Process and Certification 12.3.4. Test driven development 12.4. Defense Business Systems (DBS) 12.4.1. Business Capability Acquisition Cycle (BCAC) 12.4.2. Capability Support Plan (CSP) 12.5. Information Technology Service Management (ITSM) 12.5.1. Enterprise level ITSM strategy development 12.5.2. Help desk support and trend analysis 12.5.3. Service Quality Management measures and metrics 12.5.4. IT Performance Management measures and metrics 12.5.5. DOD Enterprise Service Management Framework (DESMF) 12.5.6. Service Level Agreements (SLAs) and Interface Control Agreements (ICA) management

Product support is scoped by the IPS Elements, which provide a structured and integrated framework for managing product support.

A.1 Product Support Management

Objective. Plan and manage cost and performance across the product support value chain, from design through disposal.

Description. Plan, manage, and fund product support across all IPS Elements.

A.2 Design Interface

Objective. Participate in the SE process to impact the design from its inception throughout the life-cycle, facilitating supportability to maximize the availability, effectiveness and capability of the system at the lowest TOC.

Description. Design interface is the integration of the quantitative design characteristics of SE (reliability, maintainability, etc.) with the functional logistics elements (i.e., IPS Elements). Design interface reflects the driving relationship of system design parameters to product support resource requirements. These design parameters are expressed in operational terms rather than as inherent values and specifically relate to system requirements. Thus, product support requirements are derived to ensure the system meets its availability goals and design costs and support costs of the system are effectively balanced. The basic items that need to be considered as part of design interface include:

- Reliability
- Maintainability

- Supportability
- IPS Elements
- Affordability
- Configuration Management
- Safety requirements
- Environmental and HAZMAT Requirements
- Corrosion Prevention and Control
- HSI
- Anti-Tamper
- Habitability
- Disposal
- Legal Requirements

A.3 Sustaining Engineering

Objective. Support in-service systems in their operational environments.

Description. Sustaining engineering spans those technical tasks (engineering and logistics investigations and analyses) to ensure continued operation and maintenance of a system with managed (i.e., known) risk. Sustaining engineering involves the identification, review, assessment, and resolution of deficiencies throughout a system's life-cycle. Sustaining engineering returns a system to its baseline configuration and capability, and identifies opportunities for performance and capability enhancement. It includes the measurement, identification and verification of system technical and supportability deficiencies, associated root cause analyses, evaluation of the potential for deficiency correction and the development of a range of corrective action options. Typically BCA and/or life-cycle economic analysis are performed to determine the relative costs and risks associated with the implementation of various corrective action options. Sustaining engineering also includes the implementation of selected corrective actions to include configuration or maintenance processes and the monitoring of sustainment health metrics.

- Collection and triage of all service use and maintenance data
- Analysis of environmental and safety hazards, failure causes and effects, R&M trends, and operational usage profiles changes
- Root cause analysis of in-service problems (including operational hazards, deficiency reports, parts obsolescence, corrosion effects, and reliability degradation)
- The development of required design changes to resolve operational issues
- Other activities necessary to ensure cost-effective support to achieve peacetime and wartime readiness and performance requirements over a system’s life-cycle

Technical surveillance of critical safety items, approved sources for these items, and the oversight of the design configuration baselines (basic design engineering responsibility for the overall configuration including design packages, maintenance procedures, and usage profiles) for the fielded system to ensure continued certification compliance are also part of the sustaining engineering effort. Periodic technical review of the in-service system performance against baseline requirements, analysis of trends, and development of management options and resource requirements for resolution of operational issues should be part of the sustaining effort.

A.4 Supply Support

Objective. Identify, plan for, resource, and implement management actions to acquire repair parts, spares, and all classes of supply to ensure the best equipment/ capability is available to support the Warfighter/maintainer when needed, at the lowest possible TOC.

Description. Supply support consists of all management actions, procedures, and techniques necessary to determine requirements to acquire, catalog, receive, store, transfer, issue and dispose of spares, repair parts, and supplies. This means having the right spares, repair parts,

and all classes of supplies available, in the right quantities, at the right place, at the right time, at the right price. The process includes provisioning for initial support, as well as acquiring, distributing, and replenishing inventories.

A.5 Maintenance Planning & Management

Objective. Identify, plan, resource, and implement maintenance concepts and requirements to ensure the best possible equipment/capability is available when the Warfighter needs it at the lowest possible TOC.

Description. Maintenance planning and management establishes maintenance concepts and requirements for the life of the system, for hardware and software, including:

- Levels of repair
- Repair time
- Testability requirements
- Support equipment needs
- Training and Training Aids, Devices, Simulators, and Simulations (TADSS)
- Manpower skills
- Facilities
- Inter-service, organic and contractor mix of repair responsibility
- Deployment planning/site activation
- Development of preventive maintenance programs using RCMA
- Condition-Based Maintenance Plus (CBM+)
- Diagnostics/prognostics and health management
- Sustainment
- PBL planning
- Post-production software support

A.6 Packaging, Handling, Storage & Transportation (PHST)

Objective. Identify, plan, resource, and acquire PHST requirements to maximize availability and usability of the materiel to include support items whenever they are needed for training or mission.

Description. PHST is the combination of resources, processes, procedures, design, considerations, and methods to ensure that all system, equipment, and support items are preserved, packaged, handled, and transported properly, including environmental considerations, equipment preservation for the short and long storage, and transportability. Some items require special environmentally controlled, shock isolated containers for transport to and from repair and storage facilities via all modes of transportation (road, rail, air, and sea).

A.7 Technical Data

Objective. Identify, plan, resource and implement management actions to develop and acquire information to:

- Install, operate, maintain, and train to maximize equipment effectiveness/availability
- Effectively catalog and acquire spare/repair parts, support equipment, and supply
- Define the configuration baseline of the system (hardware and software) to effectively support the Warfighter with the best capability at the time it is needed

Description. Technical data consists of recorded information of scientific or technical nature, regardless of form or character (such as equipment technical manuals and engineering drawings), engineering data, specifications, standards and Data Item Descriptions (DID). Technical Manuals (TMs), including Interactive Electronic Technical Manuals (IETMs) and engineering drawings, are the most expensive and probably the most important data acquisitions made in support of a system. TMs and IETMs provide the instructions for operation and

maintenance of a system. IETMs also provide integrated training and diagnostic fault isolation procedures. Address data rights and data delivery as well as use of any proprietary data as part of this element. Establish a data management system within the IDE that allows every activity involved with the program to cost-effectively create, store, access, manipulate, and exchange digital data. This includes, at minimum, the data management needs of the SE process, modeling and simulation activities, test and evaluation strategy, support strategy, and other periodic reporting requirements.

Also includes as maintained bills of material and system configuration by individual system identification code or "tail number."

A.8 Support Equipment

Objective. Identify, plan, resource and implement management actions to acquire and support the equipment (mobile or fixed) required to sustain the operation and maintenance of the system to ensure that the system is available to the Warfighter when it is needed at the lowest TOC.

Description. Consists of all equipment (mobile or fixed) required to support the operation and maintenance of a system. This includes but is not limited to ground handling and maintenance equipment, trucks, air conditioners, generators, tools, metrology and calibration equipment, and manual and automatic test equipment. During the acquisition of systems, PMs are expected to decrease the proliferation of support equipment into the inventory by minimizing the development of new support equipment and giving more attention to the use of existing Government or commercial equipment.

A.9 Training & Training Support

Objective. Plan, resource, and implement a cohesive integrated strategy early in the development process to train military and civilian personnel to maximize the effectiveness of the doctrine, manpower and personnel, to fight, operate, and maintain the equipment throughout the life-cycle. As part of the strategy, plan, resource, and implement management actions to identify, develop, and acquire TADSS to maximize the effectiveness of the manpower and personnel to fight, operate, and sustain equipment at the lowest TOC.

Description. Training and training support consists of the policy, processes, procedures, techniques, TADSS, planning and provisioning for the training base including equipment used to train civilian and military personnel to acquire, operate, maintain, and support a system. This includes New Equipment Training (NET), institutional, sustainment training and Displaced Equipment Training (DET) for the individual, crew, unit, collective, and maintenance through initial, formal, informal, on the job training (OJT), and sustainment proficiency training. Significant efforts are focused on NET which in conjunction with the overall training strategy is validated during system evaluation and test at the individual-, crew-, and unit-levels.

A.10 Manpower & Personnel

Objective. Identify, plan, resource and acquire personnel, civilian and military, with the grades and skills required a) to operate equipment, to complete the missions, to effectively fight or support the fight, to win our nation's wars; b) to effectively support the Soldier, and to ensure the best capability is available for the Warfighter when needed.

Description. It is essential to identify and acquire personnel (military and civilian) with the skills and grades required to operate, maintain, and support systems over their lifetime. Early identification is essential. If the needed manpower is an additive requirement to existing manpower levels of an organization, a formalized process of identification and justification must be made to higher authority.

A.11 Facilities & Infrastructure

Objective. Identify, plan, resource, and acquire facilities to enable training, maintenance and storage to maximize effectiveness of system operation and the logistic support system at the

lowest TOC. Identify and prepare plans for the acquisition of facilities to enable responsive support for the Warfighter.

Description. Facilities and infrastructure are the permanent and semi-permanent real property assets required to support a system, including studies to define types of facilities or facility improvements, location, space needs, environmental and security requirements, and equipment. It includes facilities for training, equipment storage, maintenance, supply storage, ammunition storage, and so forth.

A.12 Information Technology (IT) Systems Continuous Support

Definition. As defined by U.S. Code § 11101, Title 40:"(A) Information Technology with respect to an executive agency means any equipment or interconnected system or subsystem of equipment, used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency, if the equipment is used by the executive agency directly or is used by a contractor under a contract with the executive agency that requires the use—

(i) of that equipment; or

(ii) of that equipment to a significant extent in the performance of a service or the furnishing of a product;

(B) includes computers, ancillary equipment (including imaging peripherals, input, output, and storage devices necessary for security and surveillance), peripheral equipment designed to be controlled by the central processing unit of a computer, software, firmware and similar procedures, services (including support services), and related resources; but

(C) does not include any equipment acquired by a federal contractor incidental to a federal contract."

Objective. Identify, plan, resource, and acquire facilities, hardware, software, firmware, documentation, manpower and personnel necessary for planning and management of mission critical computer hardware and software systems. Coordinate and implement agreements necessary to manage technical interfaces, and to manage work performed by continuous software engineering activities. Establish and update plans for automated and continuous test and certification activities required throughout the life-cycle.

Description. Information technology systems continuous support encompasses the facilities, hardware, software, firmware, documentation, manpower, and personnel needed to operate and support mission critical information technology systems hardware/software systems. As the primary end item, support equipment, and training devices increase in complexity, more and more software is being used. The expense associated with the design and maintenance of software programs is so high that one cannot afford not to manage this process effectively and proactively. It needs to become standard practice for the program manager (PM) and product support manager (PSM) to participate in the engineering and continuous development process from program inception to ensure software engineers, systems engineers, users, and product support managers are integrated and collaborating continuously in order to accomplish the necessary planning and management of IT systems continuous support to include management of weapon system information assurance across the system life-cycle. Information systems, electronics, and software are often part of the technical data that defines the current and future configuration baseline of the system necessary to develop safe and effective procedures for continued operation of the system. Software technical data comes in many forms to include, but not limited to, specifications, flow/logic diagrams, Computer Software Configuration Item (CSCI) definitions, test descriptions, operating environments, user/maintainer manuals, and computer code. IT systems interface with the Global Information Grid (GIG) via the Defense Information Switch Network (DISN) or other network connectivity must be identified, managed, and actively coordinated throughout the life-cycle to assure mission critical connectivity. Electromagnetic

Compatibility/Interference (EMC/EMI) requirements must be periodically evaluated and tested as weapon systems and mission scenarios evolve. Electromagnetic Pulse (EMP) and other survivability requirements must be evaluated and tested at specific intervals over the life-cycle. System Security/Information Assurance is a total life-cycle management issue, with a constantly evolving cyber threat. Consider cybersecurity and supply chain risk management practices throughout the lifecycle to reduce vulnerabilities. Disaster recovery planning and execution is a requirement for mission critical systems, and will be driven by continuity of operations plans of the using organizations. Automated Identification Technology will be a significant consideration for systems that deploy or components that are transported through standard supply channels for distribution, maintenance and repair. Electronic Data Interchange (EDI) will be a constant management challenge as commercial methods and standards will change many times during the operational life of a weapon system. PMs, through the PSM, need to coordinate, at program inception, with an organic software engineering entity in order to identify intellectual property and data rights for inclusion in subsequent contracts. PSMs should collaborate with the software engineers in order to tailor data/license rights acquisition and ensure it is aligned with the acquisition and product support strategies. The PSM will also ensure the data rights and license management strategies are documented within the IP strategy[36]. The PSM will coordinate with the software engineer to develop a holistic business case analysis to determine a best value product support strategy that considers all aspects of hardware and software.

Appendix B – Typical Supporting Performance Metrics

Listed below are some select performance and cost attributes that have been shown to lead to improved Warfighter outcomes when managed, and which can support achievement of the overarching required sustainment metrics. As stated, the required sustainment metrics are the A_M (KPP), Materiel Reliability and Ownership Cost (KSA) along with the suggested Mean Down Time. A more comprehensive list with definitions may be found in the *PBL Guidebook (*https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook).

- **Reliability.** Mission reliability (e.g., Mean Time Between Mission Critical Failure, Mean Time Between Abort, Mean Time Between Operational Mission failure, Mission Completion Rate, etc.) and Logistics Reliability (e.g., Mean Time Between Failure, Mean Time Between Unscheduled Maintenance Action, etc.)
- **Availability/Readiness.** Not Mission Capable Rate, Not Mission Capable Maintenance, Fully Mission Capable Rate, Time on Wing, Ready for Tasking, Operational Availability, Sortie Generation Rates, etc.
- **Maintainability.** Corrective Maintenance (e.g., Mean Time to Repair, Mean Corrective Maintenance Time, etc.), Maintenance Support (e.g., Maintenance Man-Hours per Operating Hour, Depot Maintenance Man-Hours, etc.) and Diagnostics (e.g., Fault Detection, Fault Isolation, Cannot duplicate discrepancies, False Alarms Per Operating Hour, etc.)
- **Supply.** LRT, CWT, Issue Effectiveness, NMCS, Backorders,, Requisition Fill Rate, Order Cycle Time, Perfect Order Fulfillment, Mean Logistics Delay Time, Logistics Response Time, Back Order Rate[37]
- **Transportation.** Delivery Time for high/medium/low priority items, Percent In-Transit Visibility, Retrograde Time, Shopping Time, Delivery Accuracy, Damage in Transit, Mean Logistics Delay Time
- **Cost.** Dollar per-unit of operation (e.g., flying hour); reduction in O&S cost

[36] *Technical Data Management & Intellectual Property Guidebook Suite* - https://www.dau.edu/tools/p/Tech-Data-and-IP-Guidebook-Suite

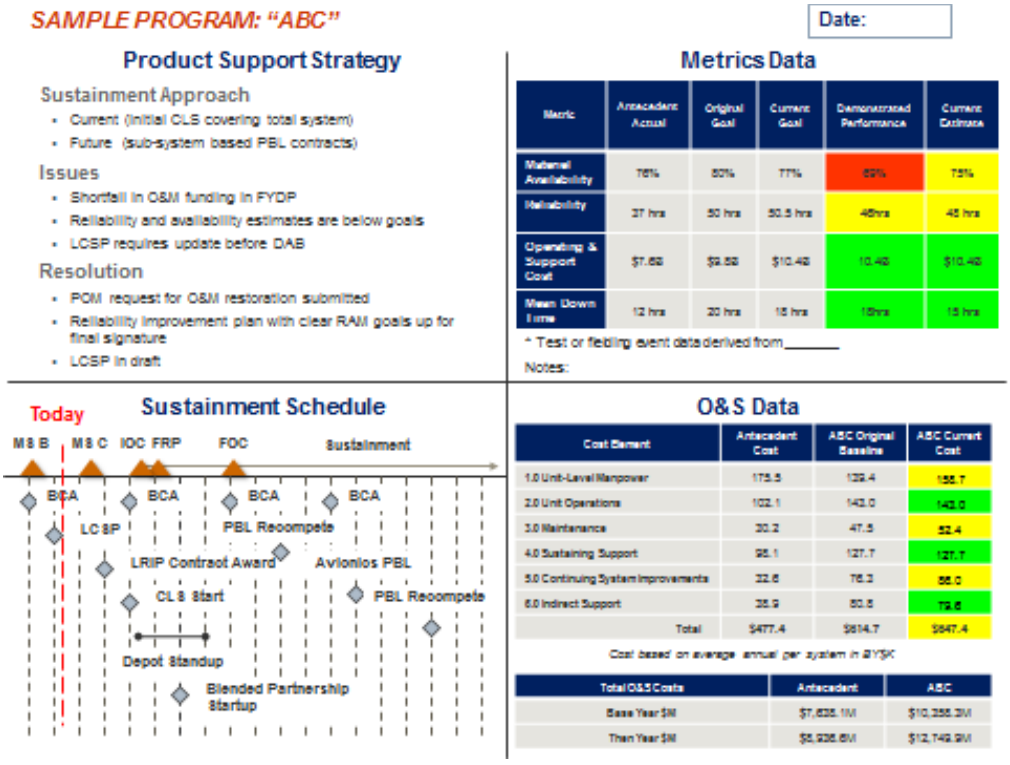
[37] *DoD Supply Chain Metrics Reference Guide*

These metrics must be mathematically and qualitatively described. They also should be:

a. Linked to system level required sustainment metrics objectives
b. Appropriate to scope and responsibility
c. Specific in units of measure
d. Specific in acceptable ranges or thresholds
e. Selected to motivate desired long-term behaviors
f. Understood and accepted
g. Easy to collect and verify
h. Readily accessible
i. Analyzed to provide timely feedback

Appendix C – Sustainment Chart & Instructions

Figure 14. Sustainment Quad Chart.



This chart helps explain program status at decision points and executive reviews.

C.1 Sustainment Chart

C.1.1 Instructions

The Sustainment Quad Chart is a tool used to provide management insight into critical logistics and materiel readiness requirements, strategy, cost and affordability aspects of the program acquisition and life-cycle sustainment strategy. The chart also informs various program life-cycle decisions. Programs generate a sustainment quad chart for all DAES reviews, OIPTs, DABs and other program reviews, driving focus on better buying power in sustainment decisions. Note: The template shown in **Figure 14** uses a notional program labeled "ABC" and includes reference to its antecedent (predecessor) program. Replace ABC and antecedent when using template to build actual chart.

C.1.2 Top Left Quad – Product Support Strategy

Purpose. Programs cite current sustainment approach and any future differences. Define and highlight key product support elements to support an assessment that planning is adequate for the life-cycle decision at hand, and sufficient to meet materiel readiness goals throughout the lifecycle. Highlight the key aspects relevant to the specific program life-cycle phase. For example, a Milestone A program should strive to develop a supportable capability, and effective and affordable support.

Fields:

- Sustainment Approach
  - Highlight the key support elements; at a minimum include the "Big-Four:"
    - Personnel (military, Government civilian, contractor)
    - Maintenance (field, sustain/Depot, software)
    - Supply (initial and replenishment consumables/repairables)
    - Data (data rights requirements/strategy and data maintenance)
  - Define overall performance-based approach and supporting analysis, BCA, PBA and contract strategy, along with the results of sustainment-related analysis to date that indicates the chosen strategy is a good deal for all parties including the Warfighter, and taxpayer.
- Issues
  - Cite any sustainment issues the program is currently experiencing, along with risks and alternative Course of Actions. Goal is NO unresolved sustainment issues before the OIPT.
- Resolution
  - Identify planned resolutions to noted issues.

C.1.3 Bottom Left Quad – Sustainment Schedule

Purpose. Highlight key elements to support an assessment that sustainment schedule is adequate for the life-cycle decision at hand, and sufficient to meet materiel readiness goals throughout the lifecycle. Sustainment elements must be synchronized with the integrated master schedule.

Fields:

- Top Bar (Milestones)
  - Include prior year's completion of significant past sustainment events (e.g., ILA, BCA, CLA/SoRA).
  - Future years should cover FYDP and post-FYDP significant events:
    - Contracts
    - Major milestones and decision reviews
    - IOC and FUE dates
    - LCSP/PBL related decision support (e.g., BCA updates)
    - ICS-CLS, organic transition dates
  - Include vertical line for current date.
- Events
  - Include key life-cycle sustainment events: BCAs, PBL decisions, ICS/CLS, organic transitions, Core Logistics determinations/Depot standup, sustainment re-competes.

C.1.4 Top Right Quad – Metrics Data

Purpose. Display current estimates of sustainment performance vs. goals and actuals for antecedent systems. This section highlights and compares key sustainment metrics/requirements, and support an assessment that performance is adequate for the lifecycle

decision at hand, and sufficient to meet A_M goals throughout the lifecycle. Metrics data should reflect the most recent sustainment performance and estimates.

Fields:

- Metrics
  - At a minimum include A_M, Materiel Reliability, O&S cost (in $ Base Year) and Mean Down Time, per CJCSI 3170 and program DAMIR submission. Include other relevant sustainment metrics as needed.
- Antecedent Actual
  - Antecedent is the system cited in the SAR.
  - Include the four metrics for the antecedent system that the MDAP is replacing.
- Original Goal
  - Values for each metric based on the original sustainment requirements or the original DAMIR sustainment metrics submission. For older MDAPs that did not have the metrics as design requirements, the original goal is the value of their first sustainment metrics submission.
  - Goal is equivalent to threshold for programs with sustainment KPP/KSAs.
- Current Goal
  - Value for each metric according to the current baseline.
  - Goal is equivalent to threshold for programs with sustainment KPP/KSAs.
  - Cite rationale for any changes.
- Demonstrated Performance
  - Actual performance to date.
  - PM assigns color rating based on estimate versus current goal:
    - Green means “at or exceeding goal.”
    - Yellow means “<10% adverse delta from goal.”
    - Red means “>10% adverse delta from goal.”
- Current Estimate
  - Projected performance at full fielding for each metric
  - PM assigns color rating based on estimate versus current goal:
    - Green means “at or exceeding goal”
    - Yellow means “<10% adverse delta from goal”
    - Red means “>10% adverse delta from goal”
- Test or Fielding Event Data Derived From
  - Cite events (DT, LUT, OPEVAL, IOT&E) or M&S tools in the current estimate.

Note: Include any relevant or additional information concerning metrics definitions.

C.1.5 Bottom Right Quad – O&S Data

Purpose. Highlight and compare O&S cost (estimates/actuals) and support an assessment that the program is affordable throughout the lifecycle.

Fields: (Reflect the SAR O&S section)

- Cost Element
  - Refer to 2007 CAIG (CAPE) Cost Estimating Guide for individual cost elements.
  - These definitions should be consistent with the SAR O&S cost section (which should be based on identical definitions). Cost estimating assumptions, constraints, ground rules, limitations, methodologies and results must match the current cost estimate.
- Antecedent Cost
  - Cost of the existing system according to CAPE cost elements
  - Average annual cost per operating unit (per system, or across a fleet)

    - Use the SAR as the basis for determining the unit.
- Program Original Baseline
  - Per CAPE cost elements, according to the first SAR submission
  - Base costs on average annual cost per operating unit (squadron, hull, brigade, etc.)
- Program Current Cost
  - Per CAPE cost elements, according to the most recent estimate (POE, SCP, ICE)
  - Base costs on average annual cost per operating unit (squadron, hull, brigade, etc.)
  - PM assigns color rating based on cost growth since the original baseline:
    - Green means “at or below original baseline”
    - Yellow means “<10% adverse delta from goal”
    - Red means “>10% adverse delta from goal”
- Total O&S Cost
  - Comparison of antecedent program vs. current total O&S present cost totals in both TY$ and BY$:
    - Based on most recent O&S estimate, not the last SAR
    - Provide notes explaining any major differences from CAPE estimates

Note: If the quantity of the MDAP being acquired is significantly different than antecedent system, match quantities in O&S totals and notate total quantities of each.

Appendix D – PSM Training, Certification & Experience Requirements

D.1 Background.

To successfully achieve the expected product support and life-cycle outcomes articulated in statute and policy, DoD and the Components must have the right people, provided the right authorities, afforded the right resources, and with the right mix of experience, expertise, leadership, training, and education assigned as PSMs. These individuals must understand how acquisition and sustainment intersect, why life-cycle management is so critical, and how to design for supportability from program inception.

Although each of the Services (and Defense Agencies which have PSMs assigned) depicts their notional career roadmap for the PSM position slightly differently, there are many commonalities across the DoD. The notional PSM career path includes progressive leadership growth, with focused education reaching beyond the minimum DAWIA educational and experience requirements to shape and develop the life-cycle logistician into PSMs, and when appropriate, into future senior executives with even greater responsibilities. It starts with clearly articulated requirements, and a rigorous commitment to human capital professional development. It continues with clearly understood competencies, a commitment to learning, and a robust and current suite of training and tools that are viewed as opportunities to prepare the individual for rigorous expectations to come. It includes robust mentorship, preparation, and a career roadmap for the individual, as well as an organizational focus on what it will take to ensure programmatic success potentially years into the future.

To ensure both current PSM success and future PSM professional development, it is imperative that DoD, the Components, Major Commands, and individual PEOs and program offices commit to the following five principles: first, build a workforce with expertise, breadth and depth; second, commit to grooming future PSMs through identification, mentoring, and coaching; third, commit to and foster a culture of continuous lifetime learning; fourth, make investing in professional development a priority; fifth, continuously refine the required competency set for LCLs and PSMs

D.2 PSM Position

To facilitate the achievement of program product support goals and responsibilities:

a. PSMs are assigned to every ACAT I and ACAT II program, prior to but no later than program initiation and to former ACAT I/II programs that are post-IOC or no longer have PMs reporting to Component Acquisition Executives (CAE).
b. The PSM position is designated in the life-cycle logistics position category
c. PSM positions for all major weapon systems must be certified at Defense Acquisition Workforce Improvement Act (DAWIA) Level III in the Life-Cycle Logistics career field in accordance with DoD Instruction 5000.66, which includes achievement of general educational, training, and experience requirements.
d. In support of the PM's responsibility required by DoD Directive 5000.01, the PSM has a direct reporting relationship and is accountable to the PM for product support. This does not preclude the PSM from having a dual reporting relationship to a DoD Component logistics or materiel command.
e. For MDAPs, major weapon systems, and programs that are post-IOC or no longer have PMs reporting to CAEs, the PSM may have a direct reporting relationship to a DoD Component logistics, sustainment, or materiel command.
f. The terms PSM, Director of Logistics, Assistant PM for Logistics, Deputy PM for Logistics, Program Lead Logistician, and System Support Manager are considered synonymous but PSM is the preferred term.
g. The PSM position shall be a KLP for all ACAT I programs, and a CAP for all ACAT II programs.
h. Cross-certification at DAWIA Level II or above in the Program Management, SE, or Business-Financial Management career fields should be considered as valued criteria during the selection process.
i. DoD Components are encouraged to establish PSM positions for other acquisition programs not defined as major weapon systems (e.g., Acquisition Category (ACAT) III programs). For acquisition programs not defined as major weapon systems, a single individual may serve as the PSM for multiple systems and products where the PEO (for portfolio PSMs at the PEO level) or PM determines such assignment is effective.
j. PEOs may use matrix support personnel from a materiel or systems command (via an MoA for positions in support of the PM/PSM), but shall not fill Core PSM positions with matrix personnel.
k. Assigned PSMs will be required to take the LOG-365 Executive PSM's Course available from the Defense Acquisition University.
l. PSMs assigned to a Key Leadership Position (KLP) on an ACAT I MDAP or Major Automated Information System (MAIS) program will also be required to meet established DoD KLP training, education, and experience requirements.
m. Hiring or insourcing PSMs with industry or commercial sector background and possessing commensurate product support-related experience, skills and expertise similar to their Government counterparts is encouraged.

D.3 PSM Career Path

There is no single career path to becoming a PSM. There may be as many successful paths to PSM as there are qualified, experienced, and motivated candidates to fill available positions. Generally, the PSM career path will include the following:

D.3.1 Entering the Life-Cycle Logistics (LCL) Workforce.

Entrance to the LCL workforce will be from one of several avenues for civilians, veterans, and military personnel. Civilians and veterans have application options using USAJOBS.gov, the official jobsite for the Federal Government. Within USAJOBS, applicants are distinguished as external and internal hires. External hires from industry are encouraged where appropriate. Entrance to the LCL workforce may occur at various points in one's career with differing levels of experience and expertise within the larger acquisition and logistics community. By the time one is assigned to PSM positions they must be in the LCL workforce.

While the majority of DoD civilian life-cycle logisticians are assigned to 0346 Logistics Management Series, internal applicants can cross train by applying for a LCL position from other

logistics occupational series such as 0343 Management and Program Analysis, 1670 Equipment Specialist, 2010 Inventory Management Specialist, and others outlined in the DoD Life-Cycle Logistics Position Category Description (PCD). Internal applicants also have various Service/Defense Agency-specific career programs that provide opportunities to enter the LCL workforce.

In addition to DoD civilians, PSMs can also come from the ranks of uniformed military personnel. Most DoD logistics officers start their careers in field units for their first four years. After those first four years, a multitude of opportunities are available to officers. To develop LCL experience, Logistics officers can be directly assigned to a LCL coded position by the assignment team. As a Company Grade Officer, military logisticians can also be competitively selected for Logistics Career Broadening Program (LCBP). After gaining initial experience and Level I/Level II certifications, officers will move between operational assignments and LCL positions to ensure career progression and meet the requirements for the LCL experience. Overall, officer development is similar to civilian LCL development, with the exception of military operational experience.

Members with diverse logistics backgrounds often possess competency sets that allow them to be very competitive for entry positions in the LCL workforce. The 2008 DoD Logistics Human Capital Strategy identified seven key LCL competencies, with varying levels of proficiency that DoD significantly values. These include:

- Logistics Design Influence
- IPS Planning
- Product Support & Sustainment
- Configuration Management
- R&M Analysis
- Technical/Product Data Management
- Supportability Analysis

Additionally, the department and the Components have identified specific attributes that are valued within the LCL workforce:

- Broad depth and breadth of experience, including serving on programs in different phases of the life-cycle, logistics experience in operational MAJCOMs, joint service experience, and Depot operations experience
- Multiple DAWIA certifications
- Exceptional life-cycle product support and subject matter expertise
- Higher-level educational training, including undergraduate and graduate degrees
- Operational and/or joint operational experience
- Professional logistics certifications desired such as the International Society of Logistics Certified Professional Logistician (CPL) or a SCM certification

D.3.2 Gaining Breadth & Depth as an LCL

Personnel should focus on gaining not only breadth of experience, but also depth of experience. Breadth means experience across the LCL competency areas listed above, as well as other logistics areas outside of the defense acquisition workforce, including the three other workforce categories identified in the 2008 DoD Logistics Human Capital Strategy (supply management, maintenance support, and transportation/deployment/distribution). Depth means progressively increasing expertise in each of the competency areas.

Expertise in all aspects of product support, both planning and execution, is essential as life-cycle logisticians progress in their careers. To fully gain breadth and depth of experience, LCLs need to consider opportunities within both traditional acquisition and sustainment organizations, including serving at organic Depot-level maintenance and/or materiel management organizations in order to develop and maintain a high level of system sustainment expertise. LCLs should work

with their supervisors to identify broadening opportunities that will enable them to obtain this experience.

D.3.3 Grooming LCLs for Entry into Senior Leadership

Life-Cycle Logisticians who have fully achieved the breadth and depth of competencies discussed in the previous section should continue to seek opportunities for professional growth. At this stage in their careers, LCLs should focus on opportunities to obtain broadening in areas outside of the life-cycle logistics functional stall. Areas of particular importance include SE, business, cost estimating, financial management, contracting, and most importantly, program management. Life-Cycle Logisticians are particularly encouraged to seek program management broadening since much LCL work, especially for programs in the O&S phase, can leverage the program management concepts, tools, and training. Additionally, program management expertise may afford personnel career opportunities outside the LCL workforce that may not otherwise be available. Interested individuals should work with their manpower and training organizations to craft a tailored career broadening program that will provide personnel opportunities to cross-train and cross-flow between the Program Management, SE, or Business/Financial Management communities and the LCL workforce.

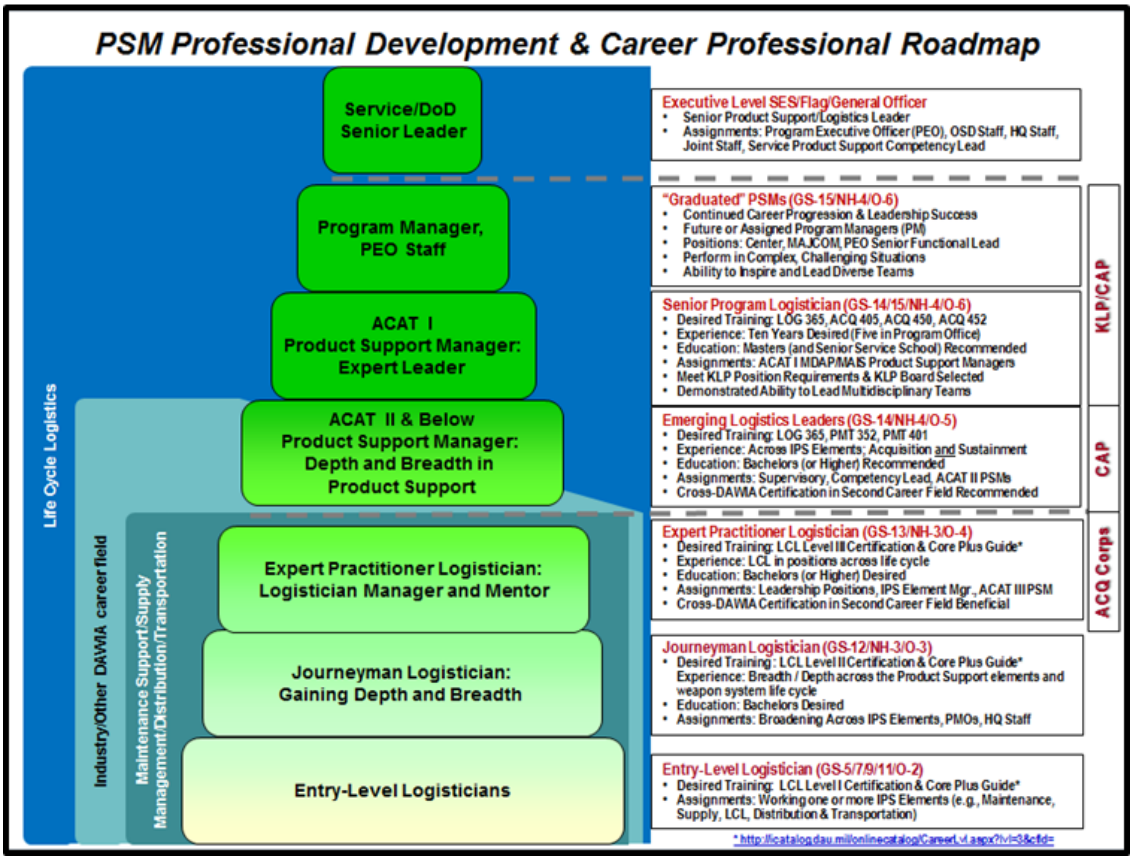
D.3.4 Core PSM: Expert Leaders

Experienced life-cycle logicians who meet the criteria outlined in this Appendix will have the breadth, depth, and expertise to assume responsibility as a formally assigned, fully qualified DoD PSM.

D.3.5 Graduated PSMs

Senior LCLs who have served as a PSM will have the background, experience, and expertise to serve in a variety of other related positions. Examples include becoming the PSM of a highly visible program such as the F-35, serving as APEO(Logistics) on a PEO staff, or assuming a senior leadership role within the broader logistics community at OSD, the Joint Staff, Service headquarters, or a MAJCOM. Senior LCLs may also find opportunities to serve as PMs or even PEOs within the program management community. The Department's notional PSM career path is shown in **Figure 15**. Each Service/Agency should tailor to fit their specific needs.

Figure 15. DoD PSM Career Path.


PSM Professional Development & Career Professional Roadmap
Service/DoD Senior Leader
Program Manager, PEO Staff
ACAT I Product Support Manager: Expert Leader
ACAT II & Below Product Support Manager: Depth and Breadth in Product Support
Expert Practitioner Logistician: Logistician Manager and Mentor
Journeyman Logistician: Gaining Depth and Breadth
Entry-Level Logisticians
Life Cycle Logistics
Industry/Other DAWIA career field
Maintenance Support/Supply Management/Distribution/Transportation
Executive Level SES/Flag/General Officer
Senior Product Support/Logistics Leader
Assignments: Program Executive Officer (PEO), OSD Staff, HQ Staff, Joint Staff, Service Product Support Competency Lead
"Graduated" PSMs (GS-15/NH-4/O-6)
Continued Career Progression & Leadership Success
Future or Assigned Program Managers (PM)
Positions: Center, MAJCOM, PEO Senior Functional Lead
Perform in Complex, Challenging Situations
Ability to Inspire and Lead Diverse Teams
Senior Program Logistician (GS-14/15/NH-4/O-6)
Desired Training: LOG 365, ACQ 405, ACQ 450, ACQ 452
Experience: Ten Years Desired (Five in Program Office)
Education: Masters (and Senior Service School) Recommended
Assignments: ACAT I MDAP/MAIS Product Support Managers
Meet KLP Position Requirements & KLP Board Selected
Demonstrated Ability to Lead Multidisciplinary Teams
KLP/CAP
Emerging Logistics Leaders (GS-14/NH-4/O-5)
Desired Training: LOG 365, PMT 352, PMT 401
Experience: Across IPS Elements; Acquisition and Sustainment
Education: Bachelors (or Higher) Recommended
Assignments: Supervisory, Competency Lead, ACAT II PSMs
Cross-DAWIA Certification in Second Career Field Recommended
CAP
Expert Practitioner Logistician (GS-13/NH-3/O-4)
Desired Training: LCL Level III Certification & Core Plus Guide*
Experience: LCL in positions across life cycle
Education: Bachelors (or Higher) Desired
Assignments: Leadership Positions, IPS Element Mgr., ACAT III PSM
Cross-DAWIA Certification in Second Career Field Beneficial
ACQ Corps
Journeyman Logistician (GS-12/NH-3/O-3)
Desired Training: LCL Level II Certification & Core Plus Guide*
Experience: Breadth / Depth across the Product Support elements and weapon system life cycle
Education: Bachelors Desired
Assignments: Broadening Across IPS Elements, PMOs, HQ Staff
Entry-Level Logistician (GS-5/7/9/11/O-2)
Desired Training: LCL Level I Certification & Core Plus Guide*
Assignments: Working one or more IPS Elements (e.g., Maintenance, Supply, LCL, Distribution & Transportation)
* http://icatalog.dau.mil/onlinecatalog/CareerLvl.aspx?lvl=3&cfd=

Building the breadth, depth, and expertise necessary to assume responsibility as a formally assigned, fully qualified DoD PSM requires a tailored career roadmap.

Appendix E – Product Support Arrangement (PSA) Types

Product Support Arrangement is a generic term that includes a wide range of relationships between organizations associated with product support. PSAs encompass the full range of formal agreements, including but not necessarily limited to contracts, MOAs, MOUs, SLAs, and Commercial Services Agreements (CSA). PSAs are used with organic and commercial sources and reflect a range of support levels. PSAs may be transactional or performance-based. When the PSA is tied to system or a subsystem/component level performance that describes measurable service and performance level parameters based on customer requirements and expectations, it is known as a PBA. The PSA should incorporate the results of the BCA, Supportability Analysis, and other product support planning. The agreement(s) become the execution vehicle for the entire orchestra of stakeholders and is the governing foundation. Strong and clear PSAs are responsible for communicating interpretable terms for successful product support.

PSAs begin with Warfighter (user) defined performance requirements that are initiated through the JCIDS. The PSM, acting on behalf of the PM, incorporates the appropriate needs and constraints in arrangements with PSIs (or with PSPs as applicable). PSIs, in turn, ensure that the necessary performance requirements to meet their arrangements are properly passed to the PSPs. PSAs should ensure that the performance expectations of all product support entities are clearly articulated.

In most cases commercial organizations use their contract as the PSA. For support provided by organic organizations, the PSA will typically be a MOA, MOU, or SLA. Discussion of typical PSAs follows.

E.1 Contracts

Contracts are implemented between the DoD and industry, they specify the requirements, parameters of support, deliverables, pricing, incentives, risk mitigation clauses, and the terms and conditions of performance. The preference is for contracts that are performance-based, which will inherently incentivize industry to invest in the continual improvement of performance while optimizing support cost (reducing the rate of cost growth, reducing overall support cost). Though specific application of these practices will vary based on the specific requirements of an individual program, analysis of performance-based contracts and lessons learned have shown a preferred contracting approach that characterizes the contract conditions and terms which best motivate this contractor behavior.

- Long term contractual relationships enable contractor investment with confidence of achieving a return on that investment.
- Stable cash flow, usually enabled by Fixed Price contracts (e.g., Fixed Price Per Flying Hour), enables confidence and motivates contractor investment.
- Performance incentives encourage contractors to meet specified objective and subjective outcome metrics, resulting in explicit (e.g., incentive fee, award fee, award term) or implicit (e.g., fixed price contracts) financial benefits to industry.
- The alignment of authority for product support functions and providers under the PSI is sufficient to enable achievement of the specified metrics by the PSI.

E.2 Memorandums of Agreement (MOA)

MOAs are agreements in which there is a reciprocal relationship in which the actions of both parties are dependent on actions by the other party; example: an organic repair function is dependent on a contractor for the timely delivery of spares needed to accomplish the repairs.

E.3 Memorandums of Understanding (MOUs)

MOUs are agreements in which there is no dependency on the other party, but recognition of their separate roles and responsibilities is required; example: an organic and commercial repair line is established in which one party accomplishes repair on one of the Shop Repairable Units (SRUs) on the end item while the other party accomplishes repair on another SRU. The MOU documents the understanding that both parties are working on the same end item, but have no dependency on each other beyond the understanding.

E.4 Service Level Agreements (SLAs)

SLAs are agreements to achieve a specified level of service; for example, a Depot makes a commitment to repair a specified number of items per time period.

E.5 Commercial Services Agreements (CSAs)

CSAs are agreements used to implement a Direct Sales PPP, in which the organic Government agency (e.g., the Depot) acts as a subcontractor to a contractor and authorizes the sale of goods/services from the Government to the contractor.

E.6 PBA Incentives & Remedies

One of the key characteristics of performance-based product support strategies and their supporting PBAs is that they are based on a private sector business model—paying for performance. As is often done in commercial contracts, incentives are included to motivate support provider behavior. It is not uncommon for contractors engaged in product support contracts to have most or all of their profit tied to meeting performance metrics. Organic PSPs (repair and maintenance Depots), also may have future workload and investment tied to meeting

performance outcomes. Organic and commercial providers both need well-defined, documented performance metrics and incentives.

E.6.1 PBA Incentives

- Award fee earned based on subjective assessment by Government on how well contractor meets/exceeds performance standards
- Incentive fee based upon the control of costs in the performance of a cost-plus-incentive-fee contract
- Award additional periods of performance-based on contractor performance
- Expand range of workload, award additional current-year workload, or award additional following-year workload
- Shared savings (implemented within an Award Fee or Incentive Fee structure) whereby contractor and Government share in any savings reductions achieved by the contractor resulting from cost or other efficiencies, design improvements, or performance/producibility enhancements
- Reliability-based profits whereby firm-fixed price contracts may be structured to provide an inherent profit incentive for a PSP to lower operating costs by achieving higher product reliability and to retain all or a portion of the savings achieved as a result of providing a better product
- Positive past performance ratings (Contractor Performance Assessment Reports or other inputs such as questionnaires provided to source selection Past Performance Evaluation Teams), which increase the chances of being awarded competitive contracts or follow-on efforts
- Investment by the industry prime in technical infrastructure that enhances the public partner's ability to perform (e.g., applications, computers, network services, tooling)
- Encouraging investment in training, certification, education
- Encouraging investment in R&M enhancements
- Encouraging investment in proactive obsolescence and DMSMS mitigation
- Encouraging investment in best business practices such as continuous process improvement and continuous modernization principles
- The award of additional business

E.6.2 Remedies for Non-Performance under PBAs

- Requiring the contractor to perform a service at no additional cost
- Reducing the price
- Reducing/eliminating award fee or profit earned under an incentive fee arrangement
- Losing award-term points, which may, in turn, lead to loss of contract performance years in accordance with award term contract provisions
- Exercise pre-planned Award Term Off Ramp if performance goals are not met
- Unfavorable Contractor Performance Assessment Report (CPAR) ratings that become part of the contractor's past performance formal record in the DoD Past Performance Automated Information System (PPAIS) database
- Terminating the contract
- Terminating the contract and re-awarding the effort to be performed at the original contractor's expense

E.6.3 Remedies for Non-Performance by Organic PSPs

- Requiring the organic provider to perform services at no additional cost until performance metrics are met
- Reducing the price
- Discounting cost-reimbursement payments as a result of non-performance within established metric time frame
- Exercise pre-planned award term off-ramp if performance goals are not met
- Terminating the arrangement without losing provider termination fees

- Terminating the arrangements and transitioning the effort to an alternate provider
- Transition to be performed at the expense of the default organization

Appendix F – Using the ILA Assessment Criteria as a Product Support Management Tool

The PSM should use the ILA criteria as a step-by-step guide to maximize the likelihood that the product support organization will achieve the Warfighter-required outcomes. Each row of the criteria is phrased as a leading statement to inspire further thought and investigation and is not intended to simply be a compliance statement.

Note that the ILA aligns with the IPS Elements but that Program Support Budgeting and Funding and ESOH are broken out separately. Budgeting and funding is aligned with IPS Element "Product Support Management," and ESOH is aligned with "Environmental Management" and "Safety and Occupational Health" in the "Design Interface" IPS Element of the *DoD Product Support Manager Guidebook*; however, they are broken out as individual IPS Elements in this handbook since they typically require a subject matter expert (SME) specific to that area.

Also note that the IPS Element Assessment Tables provide standard assessment criteria applicable to all the Service's systems. These criteria are neither platform nor system specific; rather, they are critical evaluation factors, which may be further defined in the respective Services' guides to identify Service specific or platform-unique requirements. For the purposes of the PSM, these criteria translate into a red, yellow, or green rating for each IPS Element, with red indicating an unsatisfactory status for an IPS Element, yellow indicating that work is needed to improve that IPS Element, and green indicating that the IPS Element is addressed satisfactorily for that phase of the system life-cycle.

Appendix G – Sustainment Maturity Levels (SMLs)

G.1 Introduction

The SML concept is a method that may be used by a PSM to help identify and think through the maturity level the support plan should achieve for each milestone and the extent to which a program's product support implementation efforts are "likely to result in the timely delivery of a level of capability to the Warfighter."[38] Achieving the levels will help the PSM evolve the program's product support approach to achieve the best value support solution. The SMLs provide a uniform way to measure and communicate the expected life-cycle sustainment maturity as well as provide the basis for root cause analysis when risks are identified and support OSD's governance responsibilities during MDAP program reviews. Focus is on assessing the sustainment strategy development and implementation status towards achieving Full Operational Capability and, where applicable, determining the risk associated with achieving the sustainment KPP.

The SMLs were crafted to address the full range of support options, from traditional organic based to full commercial based product support. They provide a standard way of documenting the product support implementation status that can be traced back to life-cycle product support policy and guidance without prescribing a specific solution. SMLs provide the PSM a methodology for assessing program performance-based product support implementation status and is compatible with the design evolution of the system being supported.

G.1.1 Overview:

The logistics community has the challenge of assessing risks associated with achieving and maintaining full operational capability as programs advance through the design, production, deployment and O&S phases. The SMLs were developed to provide a guidepost for the PSM as he/she matures the LCSP. They also assist in assessing sustainment strategy implementation status across programs in a consistent manner.

[38] PL 111-23

The product support package cannot fully evolve to maturity until the operational environment is defined, the sustainment requirements established and the design is stable. The SML definitions are developed to take into account a nominal level of design stability as a prerequisite for the levels. Consequently, SMLs can be a powerful tool for the PSM in determining the appropriate sustainment concept based on the system's design stability and the immediacy of the required support.

G.2 Outcomes

Table 12, below, describes key sustainment outcomes necessary to achieve the requisite criteria for each SML. The description is focused on broad "outcomes" or accomplishments, not intent or plans. The outcomes identified in Table 12 are important because they are critical in achieving the end-state sustainment concept and convincingly demonstrating maturity in the implementation process.

Table 12 is not meant to imply the various functional area levels are reached at a specific point in time. However, following the principles spelled out in DoDI 5000.02, the levels would typically be expected to be achieved in the corresponding life-cycle phase and by the indicated events. By the same token, just because a program reaches a specific milestone or event does not mean that the specific SML has been reached (or must be). Achievement is based on specific accomplishments at the time determined appropriate by the PSM vs. specific milestone events.

Implementing a plan to achieve the SMLs will help the PSM to develop and field the best value support solution making the program more affordable. Up front it will help in designing out support degraders that contribute to system downtime and to reduce TOC. During the testing and operations phases achieving the SMLs will ensure continual process improvements and design changes are made based on actual experience.

This outcome based approach also makes it easier to articulate risks when various levels are not achieved by specific milestones, as well as, form the foundation for root cause analysis. In the event they are not reached, understanding and mitigating the associated risks greatly increases the probability of fielding mitigation strategies to provide the Warfighter suitable product support. In addition, by identifying the risk area(s) early, the program can formulate and execute mitigation strategies before risks are realized and adversely affect the Warfighter.

G.3 Program Reviews

The SMLs are not intended to create additional work for programs or the DoD Components. OSD will use required program documents identified in DoDI 5000.02 when assessing product support solution progress at program reviews. These documents include the AoA, SEP, TEMP, Acquisition Strategy, APB, and the LCSP. The PM / PSM should be able to clearly articulate why the product support solution / sustainment maturity reflected in the LCSP and other program documents is appropriate for their program at that point in time.

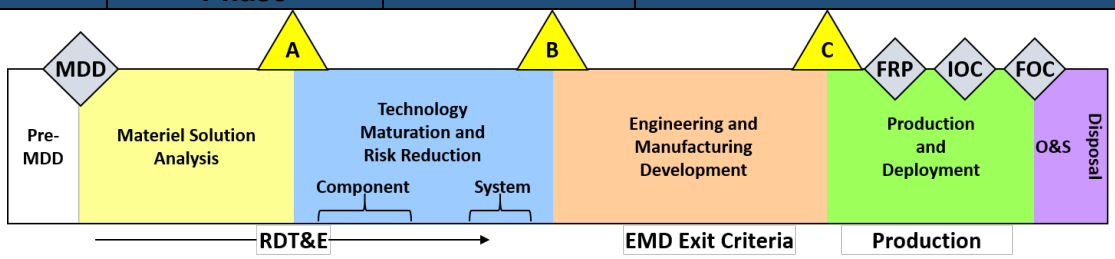
G.4 Assessing Levels

Rarely does the product support package for a system's sub-systems or components mature at the same time. For example, the design maturity for a specific sub-system may be lagging the others. Some components may be off-the-shelf, standard hardware, or made with well-established materials and processes from reliable suppliers, thus demonstrating a stable, mature design. Other components may incorporate new design elements that move well beyond the proven capabilities of a key technology resulting in a still evolving design.

Using a "weakest link" basis, a system would receive an overall maturity level that reflects the element of the system with the lowest level of maturity. In many instances, this can be effective for the simple system, but for more complex systems this approach could be misleading and give the impression of an overall level of risk greater than the actual situation. Consequently, for assessments of more complex systems, assigning a single SML to an entire system may have little value. It may be more useful to address SML by major sub-systems. A determination should still be made on the overall maturity of the support solution and LCSP development.

PSMs can use the SML model to assess and identify the appropriate level of logistics maturity of the program. The SMLs provide a uniform metric to measure and communicate the expected life-cycle sustainment maturity as well as provide the basis for root cause analysis when risks are identified and support OSD's governance responsibilities during MDAP program reviews. There are 12 SMLs, as described in **Table 12**, aligned to the major phases of the DoD acquisition and sustainment life-cycle.

Table 12: SML Descriptions.

Level	Program Assessment Phase	SML Overview	SML Description
			
1	MSA (Pre-Milestone A)	Supportability and sustainment options identified.	Basic supportability and sustainment options identified based on War fighter requirements and operational concept Potential support and maintenance challenges due to anticipated technology or operational environment identified
2	MSA (Pre-Milestone A)	Notional product support and maintenance concept identified.	Potential product support and maintenance concept alternatives evaluated and notional concept identified as part of the AoA User needs and environmental constraints impacting sustainment are identified.
3	MSA (Pre-Milestone A)	Notional product support, sustainment, and supportability requirements defined and documented to support the notional concept. (Occurs in the AoA)	Basic product support, sustainment, and required supportability capabilities identified and documented in programmatic documentation including, but not limited to AoA, Acquisition Strategy, Initial Capabilities Document (ICD), and Test & Evaluation Strategy. LCC estimates are used to assess affordability. (Also see DAG 5.4.1.3)
4	MSA (Pre-Milestone A)	Supportability objectives and KPP/KSA requirements	Preliminary sustainment planning, supportability analysis, RAM analysis, used to identify required developmental efforts.

Level	Program Assessment Phase	SML Overview	SML Description
		defined. New or better technology required for system or supply chain identified (Occurs at ASR)	T&E strategy addresses how required enabling technology and KPP/KSAs will be verified. (Also see DAG 5.4.1.2.3.2)
5	Technology Maturation and Risk Reduction (Pre-Milestone B)	Supportability design features required to achieve KPP/KSA incorporated in Design Requirements (Occurs at SRR)	Initial system capabilities have been analyzed and initial supportability objectives/requirements, and initial RAM strategy have been formulated and integrated with the SE process via SE Plan and LCSP. Design features to achieve the product support strategy, including diagnostics and prognostics, are incorporated into system performance specifications. Test & Evaluation Master Plan addresses when and how required sustainment related design features and KPP/KSAs will be verified. (Also see DAG 5.3 and 5.4.2.2.3.1)
6	Technology Maturation and Risk Reduction (Pre-milestone B)	Maintenance concepts and sustainment strategy complete. LCSP approved. (Occurs at PDR)	LCSP written and approved documenting the Product Support Sustainment Strategy. Supply Chain performance requirements identified and documented in the LCSP. Logistics risks identified and risk mitigation strategies identified and documented in the LCSP. Preliminary Support Strategy leveraging a best value mix of organic and contractor support and associated logistics processes, products, and deliverables identified and documented in the LCSP. Sustainment contracting strategy, including the extent PBL Contracts will be used, documented in the Acquisition Strategy. (Also see DAG 5.4.2.3)
7	Engineering & Manufacturing Development	Supportability features embedded in	Product Support Package element requirements are integrated, finalized and consistent with the

Level	Program Assessment Phase	SML Overview	SML Description
	(EMD) (Pre-Milestone C)	design. Supportability and Subsystem MTA complete. (Occurs at CDR)	approved system design and Product Support Strategy. Validation that the design conforms to support requirements. Sustainment metrics are predicted based on CDR results, the approved Product Support Package element requirements and projected Supply Chain performance. (Also see DAG 5.4.3.2.2.1)
8	Engineering & Manufacturing Development (EMD) (Pre-Milestone C)	Product Support capabilities demonstrated and SCM approach validated	Sustainment and product support planning complete identifying the sustainment strategy roles, responsibilities, and partnerships that will be implemented. Sustainment and product support capabilities (including associated logistics processes and products) tested and demonstrated. Supply Chain performance validated. Budget requirements are adjusted based on the design and test results
9	Production & Deployment (Post-Milestone C)	Product Support Package demonstrated in operational environment (Occurs at IOT&E)	Representative Product Support Package fielded to support operational tests. Sustainment and product support capabilities (including associated logistics processes and products) demonstrated through successful tests and demonstrations in an op. environment. Plans are developed and implemented to address any issues or “weak spots” identified in IOT&E
10	Production & Deployment (Post-Milestone C)	Initial Product Support Package fielded at operational sites. Performance measured against availability, reliability and cost metrics. (Occurs at IOC)	Support systems and services delivered to each category of operational site. Sustainment and product support capabilities (including associated logistics processes and products) proven in an operational environment. Sustainment and product support measured against planned A_M, Materiel Reliability, Ownership Cost and other sustainment metrics

Level	Program Assessment Phase	SML Overview	SML Description
			important to the War fighter. Needed improvement actions are taken based on performance data. (Also see DAG 5.4.4.3)
11	Production & Deployment (Post-Milestone C) and Operations & Support	Sustainment performance measured against operational needs. Product support improved through continual process improvement	Sustainment and product support performance regularly measured against sustainment metrics and corrective actions taken. Product support package and sustainment processes are refined and adjusted based on performance and evolving operational needs. Initiatives to implement affordable system operational effectiveness are implemented. (Also see DAG 5.4.5.5)
12	Production & Deployment (Post-Milestone C) and Operations & Support	Product Support Package fully in place including Depot repair capability. (Occurs at FOC)	Support systems and services delivered and fully integrated into the operational environment. Depot maintenance performed. Sustainment and product support performance regularly measured against sustainment metrics and corrective actions taken. Product improvement, modifications, upgrades planned. The support strategy is refined leveraging the best value mix of organic and contractor support for logistics processes, services and products. Equipment retirement/disposal planning is implemented as required.

SMLs provide a uniform set of product support performance metrics and help to analyze risks during program reviews.

Appendix H: Product Support Strategy "Fold-Out"

Figure 16. Product Support Strategy Overview.

The Product Support Strategy must balance two objectives: 1) the supported asset must affordably deliver the required warfighting capability; and 2) the product support solution must reduce support demands while meeting Warfighter requirements.

Additional details are available in the DoD Product Support Business Model (PSBM) (https://www.dau.edu/tools/t/Product-Support-Business-Model), the DoD Performance Based Logistics (PBL) Guidebook (https://www.dau.edu/tools/t/Performance-Based-Logistics-(PBL)-Guidebook) and DAU's Product Support Strategy Development Tool (https://www.dau.edu/tools/t/Product-Support-Strategy-Development-Tool).

H.1 Integrate Warfighter Requirements & Support

Starting at the 12-o'clock position in **Figure 16**, the first objective of Product Support is to develop, enable, and execute a sustainment strategy that will deliver optimum operational readiness to the Warfighter, consistent with Warfighter requirements, at an affordable, best value cost. Warfighter requirements are expressed in operational terms. Those requirements must be interpreted and translated if/as necessary into sustainment objectives that will drive the achievement of those outcomes.

H.2 Form the Product Support Management IPT

Form the PSM team that will develop, implement, and manage the Product Support. The PSM is charged with the responsibility to plan, develop, implement, and execute the product support strategy. Product support encompasses a range of disciplines including, but not limited to, logistics, requirements, operational mission planning, financial, contracts, legal, and IPS Elements functional SMEs.

H.3 Baseline the System

Collect the data (or begin data collection for new systems) that will be needed to assess and analyze support decisions, including inputs from Supportability Analysis (e.g., FMECA, FRACAS, LORA, MTA, RCMA, and other key maintenance planning tasks), as well as RAM and LCC analyses

H.4 Identify/Refine Performance Outcomes

Using your product support criteria, develop a process for identifying critical product support outcomes and how you will measure success. Identify the critical behaviors that must be influenced by your metrics to achieve your product support strategy outcomes. The starting points for metrics identification are Warfighter outcomes and OSD's specified top-level weapon system metrics. Each product support strategy, as it evolves, must be tailored consistent with the maturity of data and existence of in-place support infrastructure and capabilities. The metrics defined as accountable outcomes must be tailored accordingly, with an objective to maintain a close correlation with, and enable the achievement of, the Warfighter and OSD top-level outcomes.

H.5 Business Case Analysis (BCA)

Assess the cost, competencies, capabilities, and process efficiencies to identify the optimum best value product support solution.

H.6 Product Support Value Analysis

Best Value analysis to optimize long-term LCC and benefits. Would include: Optimum level of support (System, Sub-system, or component level), evaluation of product support strategy considerations related to the 12 IPS Elements, SCM strategy, Workload allocation strategy (including Depot maintenance, Core, 50/50, $3M Rule, and PPP considerations), refinement of program data management strategy (DMS), strategies for continuous modernization and improving system RAM, and proactively addressing obsolescence, DMSMS, and corrosion issues.

H.7 Determine Support Acquisition Method(s)

Determine whether support will be acquired from the PSPs using an outcome based or transactional based acquisition method. Decision(s) are validated or made using a best value analysis consistent with the BCA.

H.8 Designate PSI(s)

For outcome based support, identify the PSI(s) who will be delegated the responsibility to integrate support providers to deliver the specified outcomes assigned consistent with the scope of their delegated responsibility. Decision(s) are validated or made using a best value analysis consistent with the BCA.

H.9 Designate PSP(s)

Utilizing BCA value analysis as well as PSI discretionary decisions for lower tiered supplier support, select the best mix and blend of sources to perform the product support functions. Decision(s) are validated or made using a best value analysis consistent with the BCA.

H.10 Identify/Refine Financial Enablers

Identify the range, types, and amount of funding required to accomplish the required support consistent with the terms, conditions, and objectives of the PSAs.

H.11 Establish/Refine PSAs

Document the implementing support arrangements (contract, MOA, MOU, PBA, CSA, SOO/SOW for the Performance Work Statement, etc.) that assign and delineate the roles, responsibilities, resourcing, and reciprocal aspects of product support business relationships.

H.12 Implement & Oversight

Implement and manage the product support, including documenting updates to the LCSP, conducting and implementing recommendations from LA, and maturing the SML. Includes the continuous, ongoing assessment of Product Support effectiveness vis-à-vis the established governance mechanisms driving decisions and actions to review, modify, revise, or evolve product support strategies and business arrangements.

Appendix I – Key Product Support Considerations

The following discussion covers other items of interest not addressed in the body of the guidebook, but which the PSM will want to be familiar with.

I.1 Configuration Management

Configuration Management (CM) is a process for establishing and maintaining the consistency of a product's physical and functional attributes with its design and operational information throughout its life.

Configuration management and control are important factors to consider when designing the PBL strategy. In order to create the appropriate support environment and to be responsive to evolving technology and changing Warfighter capabilities, the providers assigned the responsibility for delivering the weapon system capability must have the appropriate level of CM and control. Integral to successful CM is the development of a CM plan. PMs establish and maintain a configuration control program. The PSM and program life-cycle logisticians are a key participant in the CM process. The approach and activity that have responsibility for maintaining configuration control will depend on a number of program-specific factors, such as design rights, design responsibility, support concept, and associated costs and risk. The Government maintains nominal configuration control of the system performance specification, and the contractor(s) perform CM for the design. The Government retains the authority/responsibility for approving any design changes that impact the system's ability to meet specification requirements. The contractor(s) have the authority/responsibility to manage other design changes. The Government maintains the right to access configuration data at any level required to implement planned or potential design changes and support options. Configuration Management of legacy systems should be addressed on a case-by-case basis as design changes are contemplated. The following are key attributes of the CM process:

- **Configuration Identification**: uniquely identifying the functional and physical characteristics of an item
- **Configuration Change Management**: controlling changes to a product using a systematic change process
- **Configuration Status Accounting**: capturing and maintaining metadata about the configuration of an item throughout the life-cycle
- **Configuration Verification and Audit**: ensuring product design is accurately documented and achieves agreed-upon performance requirements

The PM/PSM should consider both Government and industry standards and best practices, including:

- American National Standards Institute/Electronic Industry Alliance (ANSI/EIA) 649A, *Configuration Management,* located on the Government Electronics & Information Technology Association (GEIA) Web site, http://www.geia.org, and click on STANDARDS

- International Organization for Standardization (ISO) 10007, Quality Management – Guidelines for CM
- EIA 836, *Configuration Management Data Exchange and Interoperability,* located on the GEIA website – http://www.geia.org – and click on STANDARDS.
- Handbook (HDBK) 649, *Configuration Management*
- *MIL-HDBK-61A – Configuration Management*

I.2 Corrosion Prevention & Control

The impact of corrosion to DoD amounts to over $20 billion dollars annually and significantly reduces material availability. Therefore, corrosion control contributes significantly to the total cost of system ownership and is a key element of system supportability. Corrosion is a long-term issue that usually impacts system operation after the system is procured, but the optimal time to address the impact of corrosion is early in system development. Proper consideration of corrosion in the design phase of a system will lead to significant cost savings over the life of the system. Product support strategies should include the tracking, costing, and prevention or control of systems and structures corrosion. PMs/PSMs must concentrate on implementing best practices and best value decisions for corrosion prevention and control in systems and infrastructure acquisition, sustainment, and utilization. All ACAT programs are required to conduct Corrosion Prevention and Control (CPC) planning. The PM and PSM should seamlessly integrate CPC planning early with the overall acquisition planning. CPC planning consists of:

- Defining CPC requirements early to ensure inclusion in acquisition RFP
- Documenting CPC planning per references (DoDI 5000.02) and (DoDI 5000.67)
- Establishing the technical considerations and requirements in order to implement an effective CPC strategy throughout the life-cycle of the system
- Establishing the management structure to be used for the specific system being designed, procured and maintained, including a Corrosion Prevention Team (CPT) and Contractor Corrosion Team (CCT)

Before beginning any CPC program, PMs should consult the *Corrosion Prevention and Control Planning Guidebook for Military Systems and Equipment* available athttps://www.dau.edu/tools/t/CPC-Guidebook policies regarding corrosion prevention and examples of ways to implement CPC planning.

I.3 Data Management

Data Management (DM) is an important part of life-cycle management and product support strategy development, and should be considered early and throughout in the system life-cycle. Data systems supporting acquisition and sustainment should be connected, real-time or near real-time, to allow logisticians to address the overall effectiveness of the logistics process in contributing to weapon system availability and LCC factors. Melding acquisition and sustainment data systems into a true total life-cycle IDE provides the capability needed to reduce the logistics footprint and plan effectively for sustainment, while also ensuring that acquisition planners have accurate information about total LCCs.

Data created during the design, development, and manufacturing of a system have value to both the data provider and the PM. The PM should adopt a performance-based approach to identify the minimum data required to cost-effectively maintain the fielded system and foster source of support competition throughout the life of the fielded system. Access to data via the contractor's data system may be the best solution. The PM should determine the system's competition strategy early in the life of the program and determine minimum data needs to support the strategy and a performance-based approach to managing the data over the life-cycle of the system. Planning should include possible Foreign Military Sales (FMS) applications including applications after the system is out of the DoD inventory.

Should the PM select data access versus delivery, provisions should be made for future availability of data to support competitive sourcing decisions; maintenance and sustainment analyses; conversion of product configuration technical data to performance specifications when required for enabling TI to enhance product affordability and prevent product obsolescence; and contract service risk assessments over the life of the system. When future delivery is required, the PM should require final delivery of data in both its native and neutral digital formats. The PM should never require paper or hardcopy delivery of data created in a digital format. Regardless, the program's Data Management Strategy and LCSP should capture the planned approach for product/engineering data management, and how it will be used in product support strategy implementation.

I.4 Earned Value Management (EVM)

Earned Value Management (EVM) is a program management tool that integrates the functional stovepipes of cost, schedule, and work scope to create an aggregate picture of performance. EVM provides an early warning system for deviations from plan and quantifies technical problems in cost and schedule terms, providing a sound objective basis for considering corrective actions. EVM gives the OSD Cost Assessment and Program Evaluation (CAPE) the data necessary to provide accurate estimates of total program cost. Through EVM reporting, the contractor provides cost data as required by the contract to ensure implementation of program objectives and to facilitate PM oversight responsibilities as required by the CAIG and DoDI 5000.02. PMs must ensure earned value data reporting is specified in the contract and in DoDI 5000.02. Requiring an EVM for all firm fixed-price contracts, subcontracts, and other arrangements is a risk-based decision left to the discretion of the PM and requires a BCA.

I.5 Obsolescence/DMSMS Mitigation

According to the *SD-22 DMSMS: a Guidebook of Best Practices and Tools for Implementing a DMSMS Management Program (*https://www.dau.edu/tools/t/SD-22-Diminishing-Manufacturing-Sources-and-Material-Shortages-(DMSMS)-Guidebook), DMSMS (i.e., the loss of sources of items or material), surfaces when a source announces the actual or impending discontinuation of a product, or when procurements fail because of product unavailability. DMSMS may endanger the life-cycle support and viability of the weapon system or equipment. Compared with the commercial electronics sector, the DoD is a minor consumer of electrical and electronic devices. While the electronic device industry abandons low-demand, older technology products, DoD seeks to prolong the life of weapon systems. These conflicting trends cause DMSMS problems as repair parts or materials disappear before the end of the weapon system life-cycle. While electronics are most likely to be discontinued, obsolescence of non-electronic and commercial off the shelf (COTS) items also poses a significant problem to weapon systems. In short, DMSMS is a threat to system supportability. Solving DMSMS is complex, data intensive, and expensive.

The PM and PSM have two approaches to solving DMSMS in a system: 1) reactive (address DMSMS problems after they surface); and 2) proactive (identify and take steps to mitigate impending DMSMS problems). Examples of proactive approaches to mitigate DMSMS problems include life of system buys, managing the supplier base in concert with the Prime Contractor, and having technical data and the accompanying data rights available early in the acquisition phase to ensure the ability to re-manufacture items as necessary. DoD policy prescribes the proactive approach.

I.6 Reliability, Availability & Maintainability (RAM)

The DoD expects to acquire reliable and maintainable products that are of high quality, readily available, and able to satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price. Developers of JCIDS requirements documents (hereafter referred to as combat developers) and PMs must work together in developing mission and sustainment requirements that facilitate achieving this objective throughout the system life-cycle. Additional information and guidance is available in the *DoD Reliability, Availability, Maintainability, and Cost Rationale (RAM-C) Report Manual* (https://www.dau.edu/tools/t/RAM-C-Report-Manual).

I.7 Supply Chain Management (SCM)

Product Support in the DoD is heavily reliant on an effective and efficient supply chain. The DoD supply chain differs from a commercial supply chain in several ways.

- DoD supply chains encompass inventory management and maintenance, repair, and overhaul (MRO) functions. This is due to DoD supply chains fulfilling most of their Wholesale stock inventory from the MRO process rather than outside procurement of items as is done by commercial supply chains.
- DoD supply chains are subject to greater variability in demand than commercial supply chains. DoD systems operate in harsh environments often at high OPTEMPOs, precipitating rapid changes in equipment condition and failure rates.
- DoD supply chains face greater challenges in the distribution and tracking of items, with large numbers of deployed assets located OCONUS, often in remote locations, which stress the capability of distribution systems and asset tracking systems.
- The sheer size of the DoD supply system precipitates difficulty in accomplishing accurate demand forecasting, efficient lead times for procurement of needed spares, and difficulty in identifying potential inventory shortfalls or excessive inventory.
- DoD supply chains may be required to support systems well beyond their expected life and must sustain systems even if the original manufacturer either no longer chooses to support or is able to support the system.

The above challenges notwithstanding, the DoD supply chain, including MRO, is the single most contributing factor to the operational readiness of defense systems. The need for an efficient, effective, and timely supply chain is critical to the ready availability and consistent performance of Warfighter systems. It is imperative that the PSM give careful consideration to structuring an optimum supply chain strategy. The model for effective sourcing of supply chain functions is evident from past precedent best practices over the last decade. The introduction of Depot Maintenance PPP in 1998 defines the parameters of this sourcing, merging the best capabilities of both the public and private sectors. Title 10 requirements for Core and 50/50 compliance generally dictate that the majority of “touch labor” for MRO will be accomplished by organic Government personnel at DoD Depot Maintenance Activities (DMAs). After satisfaction of Core requirements, the PSM has the option (again, considering 50/50 compliance) to source “above Core” MRO workloads to a commercial source. Of critical importance to efficient Depot maintenance is the assurance of a ready and available supply of spares needed to accomplish the MRO function. This includes the requirement to have rights to form, fit and functional technical data as spelled out in Title 10 section 2320, and when appropriate, more detailed technical data necessary for re-manufacturing, re-procurement and/or sustainment engineering as needed to ensure full life-cycle sustainment and disposal/demilitarization. Consistent with the 1999 (and continuing) emphasis on a shift of the DoD role to “managing suppliers, not supplies”, the use of commercial SCM for wholesale inventories has proven to be a successful model, leveraging industry’s capability to shorten procurement lead times, develop more efficient demand forecasting processes, and in general reduce the non-repair portion of the supply chain process to lower the total repair turnaround time for MRO items. While the exact tailoring of the supply chain sourcing strategy is dependent on the BCA analysis, the objective should be to use the best competencies of organic and industry resources.

Identification of a SCM strategy is critical to the success of any product support strategy BCA effort. Materiel support is a critical link in weapon systems supportability. All the skilled labor, advanced technology, and performance mean little without the ‘right part, in the right place, at the right time.’ The supply chain is also a primary target for utilizing industry flexibility, capability, and proprietary spares support. DoD Materiel Management usually addresses four categories of supply support items:

- **Unique Repairable Items.** These are repairable (subject to repair) parts that are unique to the system (not common with other DoD systems). They are often sourced by the prime vendor/OEM of the system. Strong consideration should be given to allocating

responsibility for wholesale support of these items to the OEM, who has readily available technical data and identified sources.

- **Common Items.** These parts are common with other systems and may have a variety of sources. They are usually managed within the DoD materiel management process but are also candidates for commodity-level and/or corporate PSAs.
- **Unique Consumable Items.** These are consumable (discarded after use) items that are used only on the target system and are usually sourced by the Prime Vendor/OEM of the system. Strong consideration should be given to allocating responsibility for acquisition of these items to the Prime Vendor, which may elect to use the Defense Logistics Agency (DLA) as the preferred source of supply.
- **Common Consumable Items.** These are consumable items used across more than a single system and are generally managed and provided by DLA. It may be viable to allow the Prime Vendor to procure these items, as appropriate, should DLA be unable to meet time, cost, or quantity requirements. If needed, the PM should encourage establishing a PBA between DLA and the vendor when private support is chosen.

Unique DoD Inventory should always be considered, and a plan for draw down in place, prior to implementing decisions to draw spares and repairs from private sources. Transfer of ownership of spares and equipment, when necessary to support a contract during LRIP or Interim Contract Support (ICS), needs to be managed appropriately to ensure equitability of capitalization and credit issues. SCM includes the distribution, asset visibility, and obsolescence mitigation of the spare parts. From a Warfighter's perspective, transportation and asset visibility have a substantial impact on high-level metrics and should be emphasized in the product support strategy.

I.8 Workload Allocation & PPP

DoD policy requires that "Sustainment strategies shall include the best use of public and private sector capabilities through Government/industry partnering initiatives, in accordance with statutory requirements." (see Ref. 6) An effective support strategy considers best competencies and partnering opportunities. Building on the previously developed System Baseline, the PM/PSM and the Product Support Management IPT must consider each discrete workload and assess where, how, and by whom it can best be accomplished, while considering statutory (see Ref. 30, Title 10, U.S.C.), regulatory, and pertinent DoD/Military Service guidance such as Depot Source of Repair (DSOR) determinations and Depot Maintenance Inter-service Support Agreements (DMISA). In general, support workloads should include system-unique subsystems, commodities, or components; and common subsystems, commodities, and components. Within these categories, various characteristics should be considered as the workload allocation and sourcing decisions are accomplished, to include: Title 10 U.S.C. applicability (e.g., to Core, 50/50, etc.); existing support process (e.g., contract, organic); existing support infrastructure (in-place, to be developed); best capabilities evaluation (public/private-sector market research); and opportunities for PPP.

The development of an effective support strategy should consider all of these factors in arriving at best value decisions, using decisions tools, including BCAs, to develop the optimum support sourcing decisions. Additional information is available in the DoD Public-Private Partnering (PPP) for Product Support Guidebook (https://www.dau.edu/tools/t/DoD-Public-Private-Partnering-(PPP)-for-Product-Support-Guidebook) and the DoD Product Support Business Case Analysis (BCA) Guidebook (https://www.dau.edu/tools/t/Product-Support-Business-Case-Analysis-(BCA)-Guidebook).

Appendix J – Key References & Resources for the PSM

Statutory

- 10 U.S.C. §2208 Working Capital Funds
- 10 U.S.C. §2320 Rights in Technical Data
- 10 U.S.C. §2337 Life Cycle Management and Product Support
- 10 U.S.C. 2337a: Assessment, Management, and Control of Operating and Support Costs for Major Weapon Systems
- 10 U.S.C. §2366a Major defense acquisition programs: certification required before Milestone A approval
- 10 U.S.C. §2366b Major defense acquisition programs: certification required before Milestone B approval
- 10 U.S.C. §2437 Development of Major Defense Acquisition Programs: Sustainment of System to be Replaced
- 10 U.S.C. §2441 Sustainment Reviews
- 10 U.S.C. §2443 Sustainment factors in weapon system design
- 10 U.S.C. §2460 Definition of Depot-Level Maintenance and Repair
- 10 U.S.C. §2464 Core Logistics Capabilities (“Core”)
- 10 U.S.C. §2466 Limitations on the Performance of Depot-Level Maintenance of Materiel (“50-50 Rule”)
- 10 U.S.C. §2469 Contracts to Perform Workloads Previously Performed by Depot-Level Activities of the DoD: Requirement of Competition ("$3M Rule")
- 10 U.S.C. §2474 Centers of Industrial and Technical Excellence: Designation; Public-Private Partnerships ("CITEs")
- 10 U.S.C. §2563 Articles and services of industrial facilities: sale to persons outside the Department of Defense

Policy

- DoDD 5000.01, The Defense Acquisition System
- DoDI 5000.02, Operation of the Defense Acquisition System (Enclosure 6)
- CJCSI 5123.01H Charter of the Joint Requirements Oversight Council (JROC) and Implementation of the Joint Capabilities Integration and Development System (JCIDS)

Tools, Training & Resources

- Life Cycle Logistics Functional Community Gateway
- Key Product Support Policy, Guidance, Tools & Training
- PSM Reference & Resource Repository
- Product Support Strategy Development Tool
- Logistics Community of Practice (LOG CoP)
- PBL Community of Practice (PBL CoP)
- Additive Manufacturing Community of Practice (AM CoP)
- Diminishing Manufacturing Sources & Material Shortages (DMSMS) Knowledge Sharing Portal (DKSP) (DMSMS CoP)
- Life Cycle Sustainment Plan (LCSP) Outline
- DoD Product Support Analytical Tools Database
- DoD Product Support Business Model (PSBM)
- Product Support Implementation Roadmap Tool
- DAU Logistics & Sustainment Director’s LOG Blog
- LOG 465 Executive Product Support Manager’s (PSM) Course
- Life-Cycle Logistics ACQuipedia Article Repository

- Life Cycle Logistics Professional Reading List
- Key Product Support Definitions

Guidance

- Integrated Product Support Guidebook Suite (12 Key Product Support Guidebooks)
- Technical Data Management & Intellectual Property Guidebook Suite
- Product Support Manager (PSM) Guidebook
- Defense Acquisition Guidebook (DAG) Chapter 4 Life Cycle Sustainment
- Performance Based Logistics (PBL) Guidebook
- Integrated Product Support (IPS) Element Guidebook
- Independent Logistics Assessment (ILA) Guidebook
- Public-Private Partnering (PPP) for Product Support Guidebook
- Condition Based Maintenance Plus (CBM+) Guidebook
- Operating & Support (O&S) Cost Management Guidebook
- Product Support Business Case Analysis (BCA) Guidebook
- Diminishing Manufacturing Sources & Material Shortages (DMSMS) Guidebook (SD-22)
- DoD Reliability, Availability, Maintainability, and Cost Rationale (RAM-C) Report Manual
- Reliability Centered Maintenance (RCM) Manual (DoDM 4151.22-M)
- DoD Risks, Issues, Opportunities (RIO) Guide
- Test & Evaluation Management Guidebook
- Joint Capabilities Integration and Development System (JCIDS) Manual
- Corrosion Prevention and Control Planning Guidebook for Military Systems & Equipment

Appendix K – List of Acronyms

Acronym	Full Name
3PL	Third Party Logistics
A_M	Materiel Availability
ANSI/EIA	American National Standards Institute/Electronic Industry Alliance
AoA	Analysis of Alternatives
APB	Acquisition Program Baseline
APU	Auxiliary Power Unit
ASL	Authorized Stockage List
ASTK	Acquisition Sustainment Tool Kit
BCA	Business Case Analysis
BFM	Business Financial Manager
CAIV	Cost as an Independent Variable
CAPE	Cost Assessment and Program Evaluation
CBM+	Condition Based Maintenance Plus
CCB,CDA	Configuration Control Board Core Depot Assessment
CCMD	Combatant Command
CEA	Cognizant Engineering Activity
CITE,CLA	Center of Industrial and Technical Excellence Core Logistics Analysis
CLS	Contractor Logistics Support

CM	Configuration Management
COTS	Commercial Off-the-Shelf
CPAR	Contractor Performance Assessment Report
CPAT	Corrosion Prevention Advisory Team
CPC	Corrosion Prevention and Control
CRR	Cost Recovery Rate
CRSMP	Computer Resources Support Management Plan
CSA	Customer Service Agreement or Customer Support Agreement
CSA	Commercial Service Agreement
CSCI	Computer Software Configuration Item
CWT	Customer Wait Time
DAAS	Defense Automatic Addressing System
DAB	Defense Acquisition Board
DAG	Defense Acquisition Guidebook
DAMIR	Defense Acquisition Management Information Retrieval
DET	Displaced Equipment Training
DFAS	Defense Finance and Accounting Service
DID	Data Item Description
DISN	Defense Information System Network
DLA	Defense Logistics Agency
DLR	Depot Level Reparable
DM	Data Management
DMA	Depot Maintenance Activity
DMS	Data Management Strategy
DMSMS,DMS/MS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DPO	Distribution Process Owner
DSOR	Depot Source of Repair
DVD	Direct Vendor Delivery
DVD	Direct Vendor Delivery
DWCF	Defense Working Capital Fund
EAC	Executive Advisory Committee
EDD	Estimated Delivery Date
EDI	Electronic Data Interchange
EMD	Engineering and Manufacturing Development
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
ERP	Enterprise Resource Planning
ESOH	Environmental Safety and Occupational Health
EVM	Earned Value Management
FAR	Federal Acquisition Regulation
FCA	Functional Configuration Audit

FISC	Fleet and Industrial Supply Center
FMECA	Failure Mode, Effects, and Criticality Analysis
FMS	Foreign Military Sales
FOC	Full Operational Capability
FRACAS	Failure Reporting and Corrective Action System
FRP	Full Rate Production
FTA	Fault Tree Analysis
GEIA	Government Electronics & Information Technology Association
HCS	Human Capital Strategy
HSI	Human Systems Integration
ICE	Independent Cost Estimation
ICP	Inventory Control Point
ICS	Interim Contractor Support
IDE	Integrated Data Environment
IETM	Interactive Electronic Technical Manual
ILS	Integrated Logistics Support
IMA	Intermediate Maintenance Activity
IOC	Initial Operating Capability
IOT&E	Initial Operational Test and Evaluation
IPG	Issue Priority Group
IPS	Integrated Product Support
IPT	Integrated Product Team/Integrated Process Team
ISO	International Organization for Standardization
ISP	Information Support Plan
IUID	Item Unique Identification
JCIDS	Joint Capability Integration and Development System
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameter
KSA	Key System Attribute
LA	Logistics Assessment
L&MR	Logistics and Materiel Readiness
LCC	Life-Cycle Cost
LCM	Life-Cycle Management
LCSP	Life-Cycle Sustainment Plan
LECP	Logistics Engineering Change Proposal
LHA	Logistics Health Assessment
LORA	Level of Repair Analysis
LRIP	Low Rate Initial Production
LRT	Logistics Response Time
MIP	Materiel Improvement Plan
MOA	Memorandum of Agreement
MOSA	Modularity and Open Systems Architecture

MOU	Memorandum of Understanding
MRL	Manufacturing Readiness Level
MRO	Maintenance, Repair, and Overhaul
MS	Milestone
MSA	Materiel Solution Analysis
MTA	Maintenance Task Analysis
MTIS	Material Turned-in to Store
NAVICP	Naval Inventory Control Point
NDA	Non-Disclosure Agreement
NDAA	National Defense Authorization Act
NET	New Equipment Training
NMCS	Not Mission Capable Supply or Non-Mission Capable Supply
NWCF	Navy Working Capital Fund
O&M	Operations and Maintenance
O&S	Operation and Support
OASDOASD (L&MR)	Office of the Assistant Secretary of Defense, Logistics and Materiel Readiness
OEM	Original Equipment Manufacturer
OJT	On-the-Job Training
OPEVAL	Operations Evaluation
OPLAN	Operations Plan
OPORD	Operations Order
OSD	Office of the Secretary of Defense
P&D	Production and Deployment
PBA	Performance-Based Agreement
PBBM	Performance-Based Business Model
PBH	Power by the Hour [©Rolls-Royce]
PBL	Performance-Based Logistics
PCA	Physical Configuration Audit
PEO	Program Executive Office or Program Executive Officer
PESHE	Programmatic Environmental, Safety and Occupational Health Evaluation
PHS&T	Packaging, Handling, Shipping, and Transportation
PM	Program Manager
PMF	Performance Measurement Framework
POC	Point of Contact
POF	Perfect Order Fulfillment
PPAIS	Past Performance Automated Information System
PPBE	Planning, Programming, Budgeting, and Execution
PPP	Public-Private Partnership
PQDR	Product Quality Deficiency Report
PSA	Product Support Arrangement

PSBM	Product Support Business Model
PSDM	Product Support Decision Matrix
PSI	Product Support Integrator
PSM	Product Support Manager
PSP	Product Support Provider
R&M	Reliability and Maintainability
RAM	Reliability, Availability, and Maintainability
RBS	Readiness Based Sparing
RCMA	Reliability Centered Maintenance Analysis
RDD	Required Delivery Date
RDT&E	Research, Development, Test, and Evaluation
RFID	Radio Frequency Identification
ROI	Return on Investment
RSSP	Replaced System Sustainment Plan
RTAT	Repair Turn Around Time
SAR	Selected Acquisition Report
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference-model
SDR	Supply Discrepancy Report
SEP	SE Plan
SIM	Serialized Item Management
SLA	Service Level Agreement
SLEP	Service Life Extension Program
SME	Subject Matter Expert
SML	Sustainment Maturity Level
SOO	Statement of Objectives
SOW	Statement of Work
SRT	Stock Repositioning Time
SRU	Shop Repairable Unit
SSA	Supply Support Activity
SSA	Strategic Supplier Alliance
STO	Stock Transfer Order
TADSS	Training Aids, Devices, Simulators, and Simulations
TD	Technology Development
TDD	Time Definite Delivery
TDR	Transportation Discrepancy Report
TEMP	Test and Evaluation Master Plan
TI	Technology Insertion
TM	Technical Manual
TOC	Total Ownership Cost
TPM	Technical Performance Metric
TRL	Technology Readiness Level

TSCMC	Total Supply Chain Management Cost
TWCF	Transportation Working Capital Fund
USTRANSCOM	US Transportation Command
VAMOSC	Visibility and Management of O&S Cost
WCF	Working Capital Fund
WSD	Weapon System Diagnostic
WSRT	Wholesale Stock Replenishment Time